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• **Calcined clay:** After aeration, try using calcined clay if you can afford it. I've always had good results using Turface, and the manufacturer backs its product with hard data.

If you can't afford calcined clay, try adding some blending sand. It's less expensive per ton, and it can reduce your compaction rate.

If neither of these options is viable, break up your existing cores with a drag mat or a piece of chain link fence, and use this material as growing medium.

• **Seed:** Remember, you need good seed to soil contact for seed to germinate. Otherwise, a large percentage of your seed will rot where it sits.

During the playing season, I use a good blend of perennial ryegrass to fill in the turf quickly. If you soak or pregerminate your seed, the process will proceed even faster.

I soak seed in a barrel for three days, changing the water daily. I then dump it onto concrete or plywood to dry. When dry, I mix the seed with organic fertilizer, which acts as a carrying agent.

I spread my seed with a cyclone spreader. If you do this before an event, the athletes' cleats will help improve seed to soil contact.

At the end of the season, I repeat the procedure, but this time I use a high-quality Kentucky bluegrass mix. If possible, I keep the irrigation system going to help establish the seed.

• **Fertilization:** A good fertilization program is also a must. You'll get the best results if you have your soil analyzed when setting up your applications. This will allow you to choose the most beneficial fertilizer for your fields.

One application I use contains a 0-0-50 mix. It increases the strength of the plant by thickening the cell walls. It also allows turf to bounce back from foot prints and tire tracks, and to stand up when cutting. I use as much as 14 pounds per 1000 square feet every growing season. The product takes time to show improvement, but the results are worth it.

If you have multi-use fields, there is no one answer to your problems. Each site is unique, and provides different challenges.

The fields I maintain are far from perfect, but I try to improve them piece by piece each year. I'm confident that they will soon be as good as any in our area.

Don't give up on your facility just because you don't have the finances or proper equipment. There are always ways around these problems.

Scott Gaunky maintained the athletic facilities at Mundelein High School in Lake County, IL, for 15 years. He is now grounds/fleet superintendent for College of Lake County, and manages 110 acres of turf and 80 acres of parking.

Cultivation for Surface Problems

by Dr. Robert Carrow

When preparing fields for play, sports turf managers must keep athletes' needs in mind. Safety and playability sit atop the list of maintenance objectives. With these goals in mind, it's important to maintain surface characteristics that athletes desire.

Firm, stable athletic surfaces provide good footing to prevent injury and facilitate play. The turf must not be too hard or too soft. It must be resilient enough to withstand intense athletic competition, cushioning falls while resisting compaction.

Surface uniformity ensures that athletes, and not field conditions, decide the outcome of play. An even surface with a dense stand of turfgrass prevents irregular ball rolls and bounces, and it gives all of the athletes equal footing.

Wear tolerance is essential to maintaining surface uniformity, particularly in high-traffic areas. A deep root system helps by resisting divots and tears. A persistent turf that will last throughout extended seasons requires strength and resilience both at the surface and in the root zone.

Cultivation basics

Surface characteristics depend on turfgrass variety, drainage contouring, and soil physical conditions. Since switching turfgrasses and improving field drainage can require extensive renovation and reconstruction, manipulating soil physical conditions provides a more practical means of improvement.

Soil physical conditions in the top three inches of the root zone can influence field characteristics dramatically. Surface cultivation can help maintain adequate physical conditions, and it can help address problems when they arise.

Cultivation can create macropores at your soil surface (pores greater than 0.12 millimeters in diameter). These enhance water infiltration and percolation, and they promote oxygen and carbon dioxide exchange between the soil and the air. Macropores also aid the soil by becoming root channels.

Cultivation also loosens your surface soil to soften the field. On fine-textured sites, the soil may be naturally hard, or it can become hard with compaction. Even coarse-textured soils exhibit surface hardness when the soil lacks organic matter or features wide particle-size distribution.

Finally, cultivation provides a means to add amendments to the soil. It opens the surface so amendments can be integrated into holes or injected directly into the turf.

Problem identification

When weighing the benefits of surface cultivation, you must first assess the primary problem you're addressing. It's important to establish whether or not the problem lies in the top three inches of your root zone.

For example, an excessively wet surface can stem from several possible causes. The natural water table may be high, particularly in prolonged wet weather. A layer below your benchmark three-inch depth may be causing a perched water table and impeding drainage. Higher-ele-

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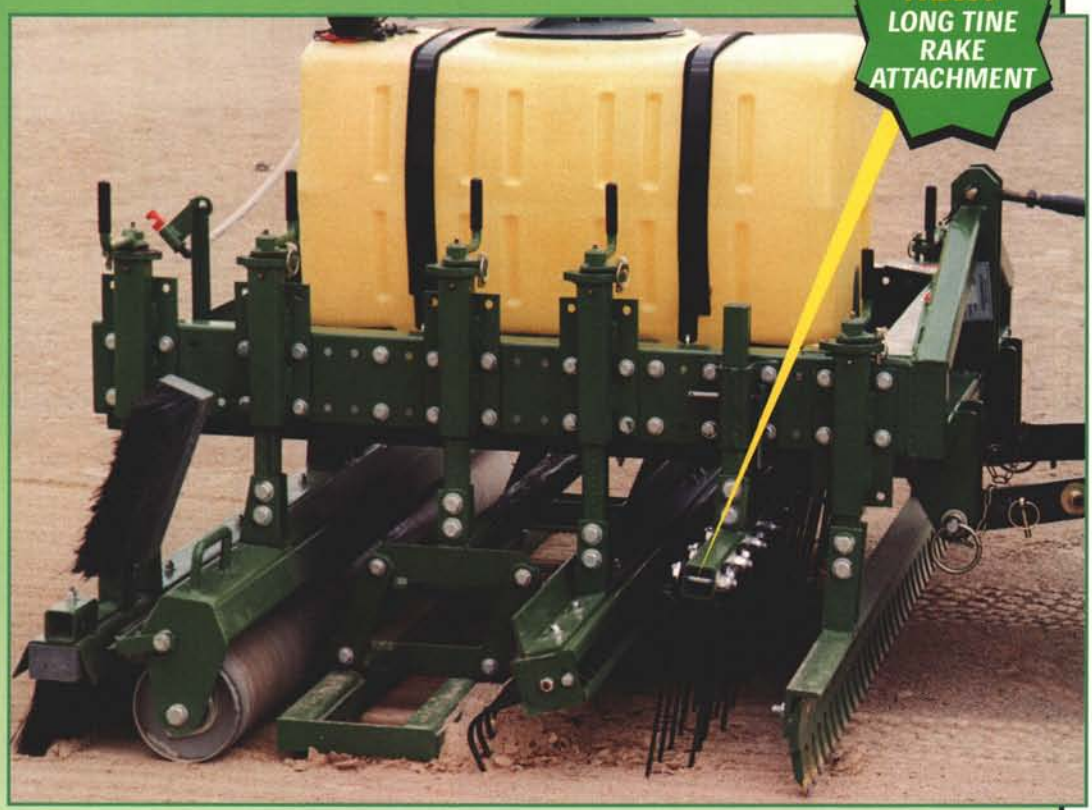

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vated adjacent grounds may be directing runoff or seepage onto the field. Insufficient surface drainage, especially "pot-hole" depressions, may be collecting extra surface water.

Surface cultivation may help alleviate some of these problems, but other approaches will be more beneficial. Field problems that require cultivation include the following:

• **Layers in the root zone's top three inches.** Fine-textured fields that are high in silt and clay can exhibit layers if the zone is compacted at the surface; if it's a sodic-affected zone; if algae lies at the surface; if a layer of different texture or composition appears in the zone, especially if the interface is distinct; if excess clay or silt is causing low infiltration, even without compaction; and if a naturally occurring caliche layer forms from high-carbonate irrigation water.

Coarse-textured sand fields can develop layers of organic matter or fine-textured layers from sod, topdressing, or water and wind deposition. Layers can also form if there is algae at the surface, or if the zone is sodic induced or calcite affected.

Courtesy: Bannerman

All of these layering situations restrict water movement and gas exchange. Most also limit rooting by increasing soil strength.

• **Hard sands.** Some sand athletic fields develop hard surfaces due to low organic matter content or wide particle size distribution. Such sands are susceptible to compaction, and cultivation can help loosen the soil temporarily.

• **Hydrophobic sands.** Water-repellent sands can cause localized dry spot (LDS) in the surface one to four inches of high-sand soils. Cultivation alone will not correct the problem, but it will help fight the condition when combined with a wetting agent application. Some high-pressure water injection units will inject wetting agents directly into the soil surface.

It's important to note that all LDS situations are not caused by hydrophobic conditions. Some apparent LDS can result from poor irrigation coverage or from shallow root systems or soils.

• **Sloped areas that cause excess runoff.** Surface cultivation can improve water infiltration on sloped sites where excess runoff results in droughted turf. At times, a semi-hydrophobic thatch on a sloped

area magnifies the problem. In such cases, add a wetting agent to your cultivation program.

• **Material injection.** At times surface cultivations can be conducted specifically to inject chemicals or physical amendments into the soil. Soil injections include insecticides, nematocides, fertilizers, wetting agents, sand, and sand substitutes.

Practical guidelines

Unsuccessful cultivation programs most often result from improper problem identification or from selecting the wrong cultivation technique. Unfortunately, no single piece of equipment can solve all soil physical problems.

Turf managers must understand the benefits and limitations of each type of cultivation technique. Turfgrass cultivation equipment manufacturers also have to do their part by promoting products based on the types of problems they can resolve.

Cultivation frequency should be carefully determined. Some problems can be permanently eliminated with one or two cultivation operations, while other problems reoccur. A layer of surface compaction can reform repeatedly under continuous traffic. Cultivation frequency should be adjusted to compensate.

If more than one problem requires cultivation, develop a program that addresses each problem. Carefully time each cultivation operation within your program according to soil moisture levels, turfgrass condition, and climatic conditions. All of these conditions must be favorable for turf to recover from the temporary injury cultivation inflicts.

Finally, periodically evaluate the effectiveness of your program. Record the effects of each operation, and ask whether your objectives are being accomplished. Benefits may include improved infiltration and percolation, better root growth, enhanced turf quality and growth, and elimination of black layer.

Dr. Robert Carrow is professor of turfgrass science at the Crop and Soil Science Department of the University of Georgia. He is a fellow of the American Society of Agronomy; vice president of the International Turfgrass Society; and he has served in numerous offices, committees, and editorial roles in professional societies and turfgrass organizations.

Pacesetter Park

1998 STMA Parks and Recreation Softball Field of the Year

by Bob Tracinski

Eight ball diamonds arranged in two quads highlight Pacesetter Park of the Sylvania Area Joint Recreation District, a mecca for competitive sports in northwest Ohio and STMA's 1998 Parks and Recreation Softball Field of the Year.

The sprawling facility also includes three soccer areas with space for 21 fields; three lacrosse fields; 38 acres of practice area; a 15,000-square foot fenced playground; two open-air picnic shelters; and a 3/4-mile paved biking/skating trail.

"Pacesetter Park is a great example of 'you build it and they will come,'" says Facilities and Maintenance Director Boyd (Rob) Montgomery. "When the site originally was selected, it was on the outskirts of a developing area. The first 69 acres purchased were basically farm fields nearly surrounded by other farm fields.

"Now it's the center of a booming area. The community has embraced the facility, our programs, and the sports opportunities it has opened for youth and adults."

Fields

All of the athletic fields are native soil. Montgomery explains, "The park's native soil isn't the best. On the original property, we had a section of wooded swampland, some spots of heavy blue clay, and at the far corner which borders mining quarries we hit bedrock at a four-foot depth."

Courtesy: Sylvania Recreation

Courtesy: Sylvania Recreation

The majority of the complex's turf is Kentucky bluegrass. The newer of the two quads was seeded with a mix of 70-percent Kentucky bluegrass varieties and 30-percent perennial ryegrass varieties.

The original ball field quad has an in-ground drainage system set at a four-foot depth. It has tiling, but no fill material and no "socks" on the tile. The other quad features an improved system installed at a 20- to 24-inch depth, with tiling on 10-foot spacings set in stone backfill.

This spring, each of the original infield surfaces of fine limestone screenings were replaced with 23 tons of red crushed brick mixed with calcined clay. Though the original infields drained well and didn't puddle, the crushed limestone got mucky or soft following rains.

"We've only had one or two cancellations since the new surfaces were installed, and that was because it was raining at game time," notes Montgomery. "The new mix drains within an hour after all but the heaviest rains, and keeps a nice, firm base.

"Since 1997, Pacesetter has used Toro's Touchnet System that works off the Osmac satellite system," says Montgomery. "The irrigation system consists of six satellites that run 552 Toro 640 sports field heads, 179 V 1550 heads and 182 570 heads. We also have a lightning detection system (ESID) compete with four warning sirens."

Mounds

"Seven of our ball fields are 300 feet; one field is 225 feet. All eight are multi-purpose diamonds for play by both youth and adult leagues.

"Each field has base socket settings of 80, 70, 65, 60, and 50 feet. Because our fields are used for both softball and baseball, there are no true mounds. They have all-skinned infields with a small crowned area in the center, and a graduated slope down from there.

"Two years ago we developed an interchangeable mound system similar to the Hollywood base system to facilitate easy movement of the pitcher's mounds. We established pitcher's mound socket settings of 53, 50, 46, 40, 38, and 35 feet. The in-ground connectors are set 1/2 to 3/4 inch below the grade of the infield — deep enough so they're not exposed — and are covered with rubber base caps when not in use.

Facility and Maintenance Director Rob Montgomery receives Field of the Year honors from STMA President Steve Guise. *Courtesy: STMA*

Courtesy: Sylvania Recreation

"Previously, our crews spent from five to 20 minutes setting up the pitcher's mound, especially with the limestone infields. Now it's a two-minute job."

Teamwork

Pacesetter Park's ball field quads are in use every weekend between May 17 and October 3. Despite this intense schedule, only Montgomery and a full-time maintenance supervisor made up the year-round staff through 1998.

Montgomery added a second full-time maintenance supervisor this year. The three-person team manages 16 to 17 part-time and seasonal crew members.

Montgomery says, "Many people come back year after year, so much of our crew is experienced. All our crew members take pride in their work, doing those extra steps that show they've taken an ownership position."

Coordination and cooperation go hand in hand for Montgomery. He's established great working relationships with the city, township, and school district that have resulted in reciprocal arrangements on services and equipment use.

Maintenance

With the heavy native soil and extensive heavy field use, Montgomery has developed an aggressive program of maintenance and cultural practices to keep the fields in prime condition.

Key to the maintenance program is frequent, extensive aerification. To make the most of each aerification pass, Montgomery set up an aerifier with slicing tines on the side opposite the mounted coring tines, so the unit cores and slices at the same time.

Crews cover the area in five or six directions during early spring before play begins. They aerate again in June, August, September, and November, covering the area in four directions each time. During the playing season, the cores are vacuumed from the field. During non-playing periods, they're allowed to remain in place to decompose.

It's obvious Montgomery is proactive on sports turf management, always on the lookout for new information, ideas, and techniques. He says, "Things keep changing and you have to stay ahead of it. Part of that is taking advantage of educational opportunities; part is listening to the input from others, including your crews. Every step that increases efficiency or improves the quality of what we do, moves us that much closer to our goals."

Bob Tracinski is business communications manager for John Deere in Raleigh, NC. He is public relations co-chair for the National STMA.

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