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On the cover:
The Best Management Practices (BMPs) for turfgrass water conservation can be employed by all levels, from the well trained turfgrass professional to homeowners. The BMPs are basic agronomic tools that will improve the overall health of the turfgrass plant and, in turn, will condition the grass to better withstand seasonal and prolonged drought. For a few BMPs specific to turfgrass water conservation see page 30.

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From the Sidelines

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Finally made it

As long-time readers of this space might recall, I am a Penn State grad. In the late 1970's, Beaver Stadium on the east end of campus wasn't much more than a really, really big set of bleachers with (not enough) bathrooms underneath. Fast forward to last month when the Keystone Athletic Field Managers Organization set up a chance to walk the turf at Beaver Stadium as part of Penn State's Field Days. I finally stepped foot on the hallowed field, more than 35 years after I'd first seen it.

Herb Combs, CSFM, athletic field supervisor at Penn State, addressed the tour, starting with some history of maintaining the Kentucky bluegrass turf, which for many years was the prized darling of local turfgrass legend Bob Hudzik. Combs is in his 9th year at Penn State, the last 4 of which he's been in charge following Hudzik's retirement. He is responsible for more than 200 acres of grounds and fields at the University Park campus, employs seven full-time crew members, including the luxury of one full-time mechanic. There are 19 other student workers, of which 75% are normally PSU turfgrass students, who work on 20 acres of quality turfgrass, 60 acres of intramural fields, and seven synthetic surfaces.

He said only the softball field on campus was built to modern standards of athletic field construction; the current field in Beaver Stadium was built in 1960 with a gravel blanket under 18 inches of native soil, with only a steep crown for drainage. As he put it, "no fancy heating system, no fancy growing medium, no fancy drainage system." Combs said that legendary coach Joe Paterno wouldn't allow any changes to modernize the field during his long tenure at the helm, though an irrigation system was added in 2006 to replace water wheels. The field has only been re-sodded four times in the past 35 years (the end zones were resodded this year).

Combs said his is a constant learning curve regarding learning what the various coaches he deals with want. "We keep our heads down and do we what do," he advised. "You can say 'no' three times but coaches usually eventually spin things to their advantage."

Combs credited Hudzik as being ahead of his time when many years ago he devised a "drill and fill" program in which the crew used a hand auger, yard by yard, to pull the native soil and backfill with sand to improve drainage. Combs also said the current popularity of fraze mowing, removing the top ¼ to ½ inch layer of a field to remove problematic materials, was a process begun by Hudzik in the 1980's to incorporate sand into Beaver Stadium's soil profile. With no verticutter on hand, Hudzik instead used a Jacobsen overseeder after removing the seeding equipment, leaving just the knives to disrupt the turf before putting down the sand topdressing.

The turf is mowed at 1 inch and receives 5 or 6 pounds of nitrogen a year and now features four Toro soil sensors to check moisture levels. Combs does test the Gmax hardness levels regularly to add to the more than 30 years of records that Hudzik kept on all issues relating to the field's maintenance.

Andy McNitt, PhD, the turfgrass science program coordinator, professor of soil science, and director of PSU's Center for Sports Surface Research, was on the tour and recommended to attendees that to fight layering in the rootzone, "You have to beat it up with deep verticutting and hollow tining aeration; beating it up allows the roots to grow through those layers."

McNitt and Combs also discussed watering fields, and both emphasized that stressing your grass a bit is a good thing. "You want it stemy and gnarly going into the season," McNitt said. "A bit of drought stress is okay; then you load it up again with water and let it go awhile again." ■

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President's Message

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We have a plan so let's use it!

I am happy to report that at the recent Board of Directors meeting we spent valuable time developing a new, 3-year strategic plan to keep STMA positioned for success. I am proud to be part of an organization that promotes its members, is forward-thinking, is not afraid to try new ideas, and is transparent. Your board represents the interests of each member category and the differing ideas and viewpoints that come together to find common ground make STMA a cut above the rest. The full strategic plan for 2015 – 2017 will be unveiled at the conference in January. See page 44 in this issue for a preview of the major platforms we will be addressing.

A recap of the 2012 -2014 strategic plan will be given later this year, and I hope you will agree that we have accomplished much for the growth and viability of the profession. You will see that we did not put a neat bow on the plan and leave it on the shelf to collect dust. The objective of a plan is to develop goals and tasks to accomplish for the overall good of the association. The same is true for plans you develop at your facility. Remember that once you have finalized a plan, you need to implement, review, update and adjust. Even though not everything that looks good on paper translates into good results, in the real world you need to keep striving to meet your goals to garner success. I am sure there are not many of us who operate without a turf management plan that must be implemented within our resources, reviewed regularly, adjusted for use and weather, and updated to ensure it meets the needs of the turf and provides a safe surface for user groups. STMA's strategic plan is reviewed at every Board meeting and the appropriate sections are given to committees to guide their tasks.

During the planning process we recognized the need to revamp our mission statement and develop a vision statement. The mission statement tells who we are and what we do: "Professionals in sports field management and safety coupled with education, awareness and industry development." The vision statement tells where we want to be: "The recognized leader to enhance and strengthen the members and the industry."

One of our sayings here in Lexington is that poor planning on your part should not create a crisis for us. No one likes to pick up the pieces for someone else's lack of planning. Your Board and staff want to ensure you that we are doing everything to prevent you from falling into crisis mode. Our hope is that we set you up for success through networking, education and professionalism.

It is never too early to plan. Even though it is only September, here in Lexington we are already planning for next July's capital projects. We are also planning for our snow operations, but I try not to think of that just yet. One final thought to remember is that a plan is only as good as the drive to achieve it. ■

SOME ROOM TO BREATHE: aerification is key to plant health

▲ **(Photo 3) Core-aerification** of an athletic field.

I like to think of the turfgrass plants growing on an athletic field as a crop, not unlike the potatoes that my father raised when I was a kid in southern Idaho. And just like the potatoes, the turfgrass plants need certain inputs and environmental conditions to maximize their performance.

It has long been my opinion that the long-term potential of a playing surface, and that of the turfgrass growing on it, is directly tied to the characteristics of the soil used to construct the field. I'm not talking about the simple soil test that you might submit annually to get an idea of where you stand with regards to the status of soil pH, organic matter content, and nutrient levels. The soil characteristics you need to pay particular attention to on your fields are the soil texture, bulk density, and the effective rootzone depth. While some of these are easier to manage than others, all of them either directly or indirectly impact plant growth and the resulting quality and durability of the sports field.

» The soil characteristics you need to pay particular attention to on your fields are **the soil texture, bulk density, and the effective rootzone depth.**

Healthy turfgrass plants have actively growing rootzones that explore a large volume of the soil profile. There are a number of things that can reduce the rooting depth of turfgrass plants. For example, maintaining a turfgrass plant at a height of cut that is below its adapted range will result in reduced rooting depth as

will the development of compacted layers within the soil profile. Any reduction in rooting depth will decrease the water and nutrient uptake of the plants, which ultimately has a negative impact on plant growth. Given the intense use of most athletic fields, this is obviously a situation we want to avoid.

There has been a significant amount work done to determine the ideal range of soil textures for use on athletic fields with recommendations often varying slightly depending on geographic location and intended use. I'm not going to get into that here. Chances are that you do not have the luxury of choosing the soil texture of the fields you are managing unless you are lucky enough to be involved in a new construction project or a significant renovation. That being said, I still feel it is important that you have a good understanding of where your fields stand with regard to soil texture. In most cases it will not be necessary to submit samples for textural analysis. However, it would be good to pull some soil cores to depth of 10 to 12 inches from a few random locations in each field to get a better idea of what you are dealing with, particularly if your field was constructed using native materials.

Pay particular attention to the consistency of soil texture from top to bottom of each core and from one location to the next. While you will expect some variability from one location to the next, particularly with a native soil field, you want to see a consistent soil texture throughout the depth of the soil cores (**photo 1.**). Note any changes in soil texture as they can lead to problems with water infiltration and root growth.

Abrupt changes in soil texture in the soil profile, often referred to as layering, can impede water movement through the profile leading to the surface staying wet longer after rainfall and irrigation events (**photo 2**). If the soil surface is at or near saturation while being used, the field will wear out more quickly. To make matters worse, the water in a soil at or near saturation acts as a lubricant for the soil particles allowing them to slip past each other more easily leading to increased compaction (bulk density) of the soil.

As bulk density in the soil increases it becomes more difficult for plant roots to penetrate the soil leading to a reduction in water and nutrient uptake. In extreme cases, soil compaction can result in surface hardness (Gmax) levels that increase the risk of impact injuries to athletes using the field. For example, the Clegg Impact Tester is used to monitor surface hardness on all NFL fields. The NFL has established a maximum threshold value of 100 Gmax for all natural and synthetic fields.

Given the intense use that most athletic fields receive, effective management of soil compaction on athletic fields is just as important as a well-developed fertility program.

Once you have a good understanding of the soil conditions you are dealing with on your fields you can begin to develop an aerification program to address any problems that exist. In general, aerification practices should be conducted on actively growing stands of turfgrass. For cool-season areas you can begin a heavy core aerification program in the spring before the first fertilization followed by light coring/pencil tining during the summer months when the grasses are under more stress and more aggressive aerification again in the fall.

Aerification of warm-season grasses should not begin until late spring or early summer once the grasses are growing vigorously. In both cases, high traffic areas should be cultivated 6-8 times a year at a minimum to maximize plant health.

▲ **Left: (Photo 1) A soil core** removed from an athletic field built with a sand-based rootzone. Note the consistent texture throughout the depth of the core, lack of any compacted layers and minimal organic matter accumulation at the surface.

Right: (Photo 2) A soil core removed from an athletic field depicting the layering of different soil types. At the bottom of the core there is a fine-textured soil that is high in clay, above that there is a 4-inch layer of sand that has been topped with an additional 3 inches of fine-textured topsoil.

There are a number of different types of equipment available that can be incorporated into an aerification program and depending on your specific circumstances you might find that you need to use more than one on a regular basis.

▲ **(Photo 5) Slicer** mounted to the front of a utility vehicle.

CORE AERIFICATION

This is arguably one of the most well-known and least appreciated approaches to maintaining high quality playing fields. Core aerification removes cores of soil from the profile to a depth of 4-6 inches using hollow-tines (**photo 3, on page 8**). There are two primary types of core-aerification: drum type and cam driven. Both come in various sizes ranging from small walk-behind units to self-propelled rider-operated units and larger tractor mounted units that attach to the three-point hitch. Drum-type aerators are less expensive and require less maintenance when compared to the cam-driven unites. However, the cam-driven units have an advantage in that they cause minimal surface disruption while achieving deeper tine penetration. The cam-driven units are also capable of much closer spacing of the holes which allows for more aggressive management of compacted soils (**photo 4**). Tine diameters for core aerators range from ¼ to ¾ inch in diameter. Larger tines will remove more soil and will have the largest impact on alleviating compaction. It is important to note that using large diameter tines on athletic fields, particularly at close spacing, is not recommended during times of active use due to the risk of reduced footing stability for the athletes.

▲ **(Photo 4) Surface view** of field following core-aerification. Note the holes where soil cores have been brought to the surface to alleviate soil compaction.

SOLID-TINE CULTIVATION

Also known as pencil-tining, solid-tine cultivation is an important management tool for use during the playing season in lieu of core aerification. Using the same c am-driven equipment that is used for core-aerification, solid-tine cultivation involves the use of small diameter (1/4-inch) tines set to penetrate the soil in a very closely-spaced pattern. By using solid tines on your high-traffic areas during the season you can improve root health by temporarily reliving compaction while causing minimal disruption to the surface. Solid-tine aerification is not a replacement for core aerification in your overall management program.

DEEP-TINE CULTIVATION

This approach to compaction management uses large diameter tines (3/4-inch) that penetrate the soil to a depth of 8-1 inches. Many manufacturers design their deep-tine cultivators in such a way that they cause fracturing (shattering) of compacted layers in the soil profile upon entry/exit of the tines. This is a great tool to use two or three times a year on fields receiving extensive use.

SLICING/SPIKING

This process involves the use of narrow elongated blades mounted to a drum and rolled across the surface of the field (**photo 5**). This causes minimal damage to the surface, stimulates plant growth and improves gas exchange with the rootzone. While this will not improve soil compaction it is a very impor-