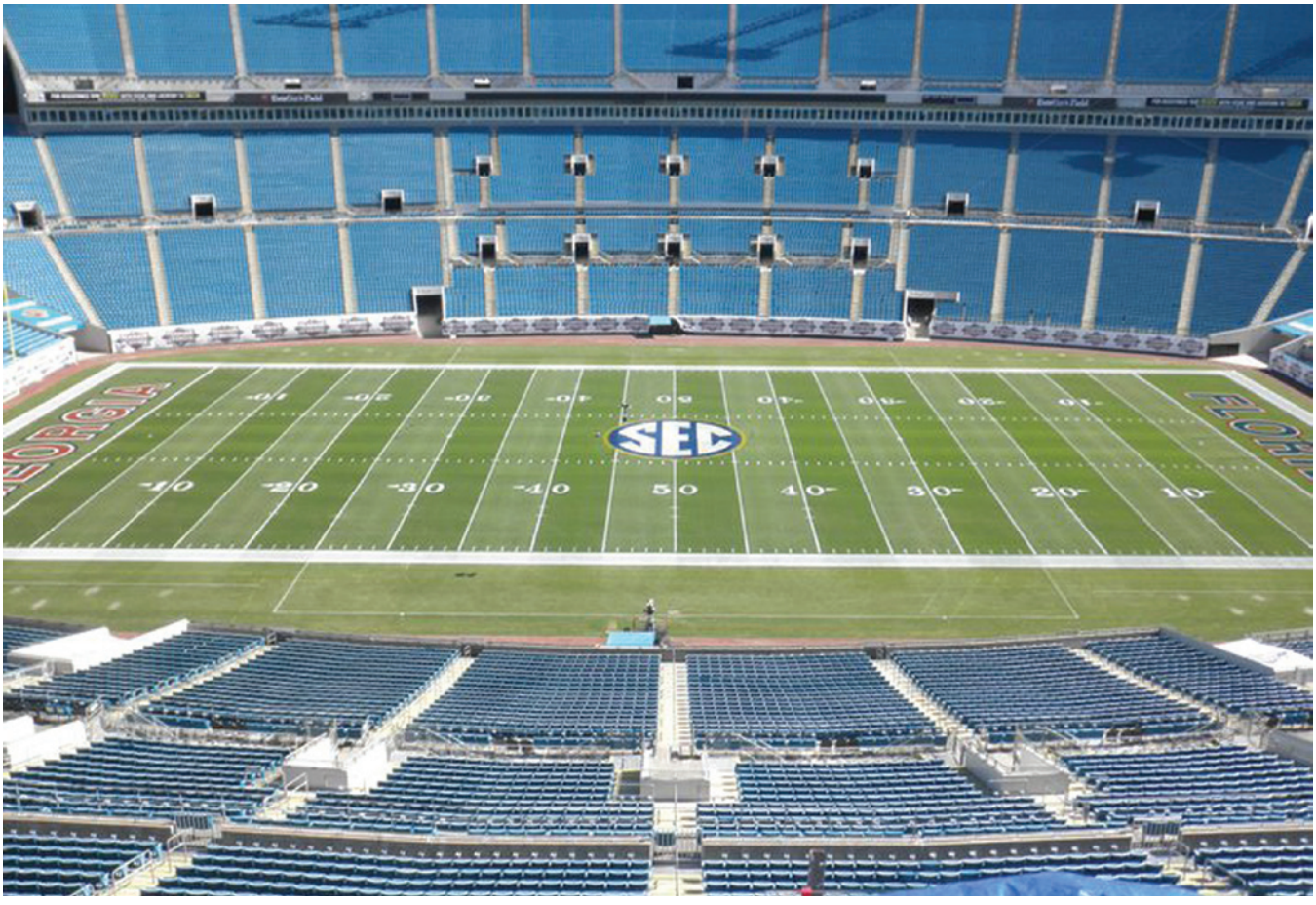
Maintenance of NATIVE SOIL compared to SAND-BASED FIELDS

While most turf managers would prefer having a sand-based field, a University of Missouri survey found around 80% of sports fields are native soil based compared to 20% being sand-based. Sand-based fields can have many benefits but unfortunately the cost of installation can be prohibitive. Regardless of the soil type, it is important to know what you are working with and how it will affect the way the field is managed.

First, let's look at what native soil and sand-based systems are and what makes them different. A native system is an unaltered soil that was at the site before the field was built. It is usually a mixture of silt, clay, and sand. A sand-based system is typically 80-100% pure sand. The difference in soil particle sizes can cause native systems to be more prone to compaction, while sand-based systems have better resistance to compaction. Due to having higher nutrient and water holding capacity, native systems might have inadequate drainage while sand-based systems, with their higher infiltration rates, provide adequate drainage.



▼ **Florida/Georgia** football game on sand-based system at Everbank Field. Image courtesy of Natasha Restuccia.

◄ Left: **Bermudagrass** growing on native soil. Image courtesy of Natasha Restuccia. Right: **Bermudagrass** growing on sand-based soil. Image courtesy of Natasha Restuccia.

COMPACTION

In native systems, the soil particle size is not uniform which can lead to increased compaction. The coarser textured sand-based system is more uniform and has less risk of compaction. For multi-use fields there will be some level of compaction regardless of your soil. Less than 200 hours play per year is recommended to maintain good field conditions; however with multi-use facilities, this is not always realistic. If space allows, rotating or moving fields can help reduce localized compaction.

With native systems having a higher water holding capacity it is important to postpone play when fields are saturated. The increase in soil moisture not only increases compaction but it also increases the depth of the compaction, which is more difficult to remedy.

One way to manage compaction is with soil cultivation, specifically aerification. In native systems, aerifying with hollow tine cores that are 5/8 to 1 inch in diameter and 3 to 4 inches deep is most effective. For fields with lower use, aerifying twice per year (spring and fall) is enough. Fields that are heavily used can be aerified 6 to 8 times per growing season. In either situation it is important that the turf is actively growing when you aerify to insure optimum recovery. In sand-based systems, hollow tine coring twice per year is usually sufficient. Higher traffic areas like goal mouths and between hash marks might require addition aerifying. Consider your options when aerifying, because repeated core aerification to the same depth can result in a compacted layer at that depth. Rotating soil cultivation methods such as deep tine aerifying, solid tine aerifying, or deep drill and fill can alleviate the problem.

TOPDRESSING

In either situation it is important to topdress after aerifying. Light, frequent applications (about 1/8 to 1/4 inch depth) are preferred over less frequent, heavy applications. After topdressing, drag the material into the canopy. Topdressing material helps with thatch control as well as leveling out low spots. In native systems topdressing can be used to modify the rootzone. Topdressing with a medium coarse sand after core aerifying can help promote drainage and reduce the risk of compaction. In sand-based systems it is important to topdress using a material that is similar to the rootzone mixture already in place. Using materials with different particle sizes can lead to layering, which can have a negative effect on drainage over time.

▲ **Layering in a sand-based system** caused by a buildup of organic matter. Image courtesy of Nick Fedewa.

IRRIGATION

The water holding capacity of native systems vs. sand-based systems will affect the way that field is irrigated. Native systems have a higher water holding capacity, allowing for less frequent watering. Native systems can be watered 1 to 1 1/2 inches every 7 to 10 days. Less frequent and deeper watering helps to encourage deeper root growth. In native systems, not watering right before an event allows the field to dry some before an event, which can reduce the risk of compaction. However, it is important to water right after the event to keep the turf from becoming stressed.

Sand-based systems have a poor water holding capacity and will require 1 to 1 1/2 inches of water every 3 to 5 days. Even in these situations, irrigation should be as deep and infrequent as possible to encourage deep root growth. Because of the increased infiltration rate of sand-based systems, irrigation can run before an event without the increased risk for compaction. Regardless of the rootzone system of your field, it is important to watch for signs of wilt, and water when necessary. Irrigation scheduling can done using evapotranspiration (ET) data, soil moisture sensors, or visual evaluation and experience.

▼ **Standing water** on a poor draining native soil system. Image courtesy of Natasha Restuccia.

DRAINAGE

Native soil systems typically have lower infiltration rates due to the higher water holding capacity, smaller pore spaces caused by compaction, and lack of drainage system. These fields will mainly depend on surface drainage from crowns and slopes. When native systems become saturated and are unable to properly drain, it is important to postpone play. Under these conditions, native systems can have reduced traction and stability, resulting in poor playability of the field and an increase in injuries to players. Aerifying native systems can open pore spaces to allow for more water flow. If the drainage becomes an unmanageable issue, installing subsurface drainage is an option; however, it can be expensive.

In sand-based systems, drainage is not typically a problem. The uniform and coarse particle size allows for larger pore spaces and increases water infiltration. If the drainage of your sand-based field seems to be getting worse, take a look at the soil at a depth of 12 to 24 inches. Older sand-based systems can start to have layering due to resodding, organic matter buildup, or topdressing with the wrong materials. These layers will slow water infiltration and may need to be remedied through deep tine aerifying or renovation.

FERTILITY

For native systems, a soil test will tell you what your rootzone is lacking. This is a good place to start in determining a fertilizer regime. Native systems are higher in clay and organic matter, both of which increase the nutrient hold capacity of the soil. This higher nutrient holding capacity means that native systems can be fertilized less often with higher rates. During the season, fertilizer is needed to increase growth rates to help fields recover from increased traffic and wear. During other parts of the year when the turf is still growing, fertilizer should be used as needed to maintain growth.

While it is best to use a slow release fertilizer for its longevity, native systems can benefit from water soluble fertilizer for recovery in worn areas of turf. In that case, lower rates should be used. The budget is always a factor in fertilizer scheduling, so treat areas of extreme wear (like goal mouths and between the hash marks) separately.

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Sand-based systems have much less organic matter and nutrient holding capability. In these systems, applying too much fertilizer at one time can lead to leaching. Leaching is not only an environmental issue, but can equal money lost. Try splitting fertilizer applications in half and apply in 14 day intervals for sand-based systems. In these systems applying less fertilizer more frequently helps to keep nitrogen available to the plant when it needs it. For sand-based systems applying potassium at a 1:1 rate with nitrogen can help with stress tolerance, but should be done so to reduce losses as potassium can be readily leached.

The basics of turf management are the same for any situation; however, knowing what your rootzone consists of can give you a better idea of how your field will respond to those management strategies. By taking the soil in to account, both native and sand-based systems can be managed to obtain excellent playing surfaces. ■

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