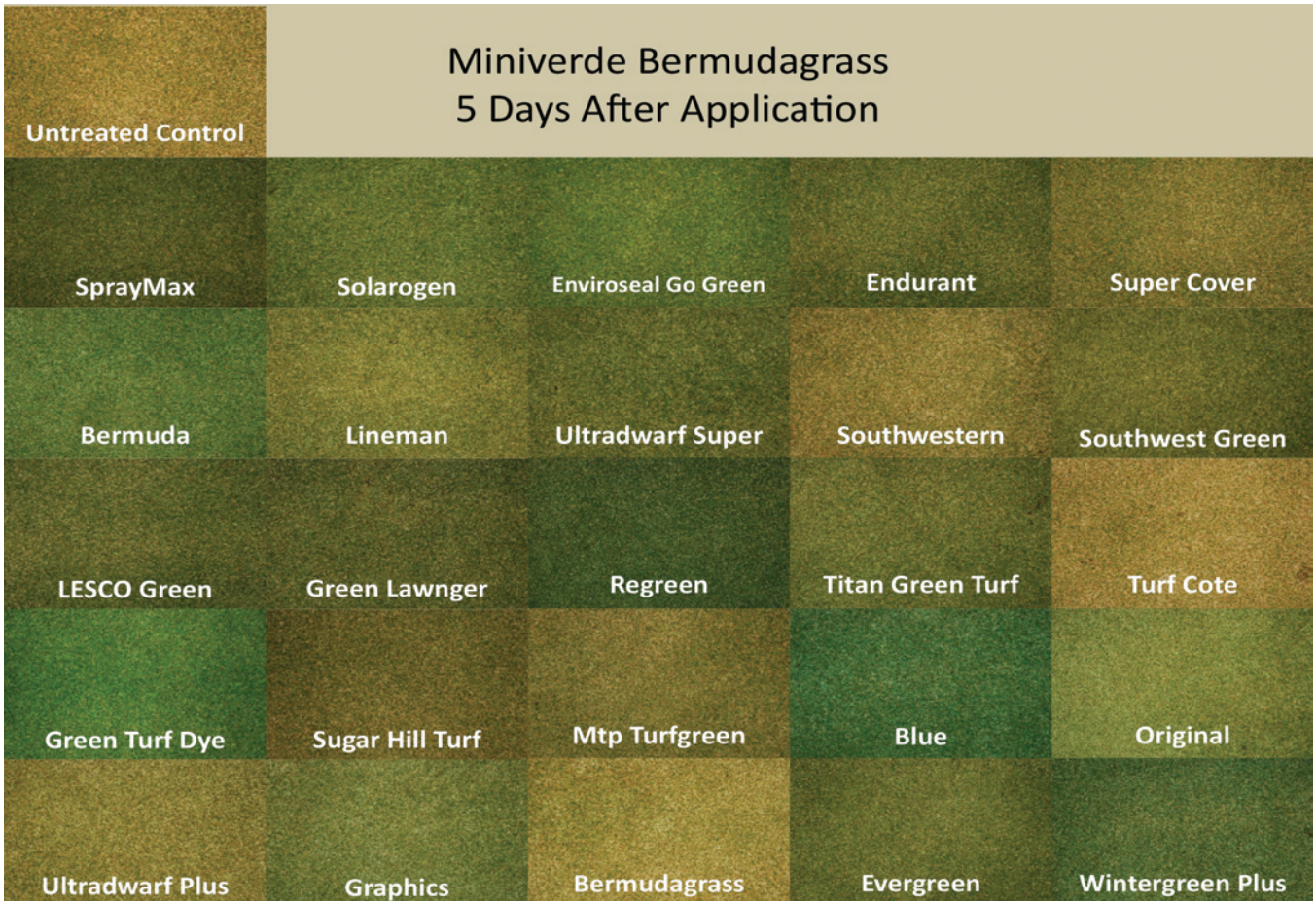

▲ **Digital images** of colorant treated plots on a Miniverde putting green.

GREEN SPORTS FIELDS USING TURF COLORANTS

Most athletic fields require an established, growing turfgrass during the winter season in order to accommodate sports play. If it is a warm-season grass some people may overseed it with ryegrass for green color, particularly if the field is to be used for late winter and early spring sports. But that is not the only way of having a green athletic field. A relatively new option is to "paint the turf green." For many years, overseeding has been the standard for providing green color over winter months. With the number of new and improved turf colorants on the market today, colorant manufacturers have given turf managers another option.

It has been called "instant overseeding"—the practice of applying a green turf colorant to dormant grass. Spring transition from overseeded grasses to bermudagrass is often problematic due to drought resistant cool-season grass varieties and extended cool and wet conditions in late spring, similar to what was experienced earlier this year in the transition zone. Applying colorant to semi-dormant to dormant bermudagrass fields provides an alternative to overseeding. But painting is not just for bermudagrass. I used bermudagrass in the above example since it is the most commonly overseeded grass. You can paint any grass; some even like to paint cool-season grasses such as tall fescue or bluegrass in order to mask unsightly blemishes.

FACTORS TO CONSIDER

One of the first questions asked is, "How much does one of these paint products cost?" A gallon of turf colorant

will run from $30 to $75, with most distributors giving volume discounts. These are concentrated products that are then further diluted before application. A typical dilution rate is one part colorant to seven parts water, although some manufacturers suggest their products can be diluted one part colorant to 15 parts water. So, carefully read the label to get an idea of how much area one can cover with the product of choice. The cost of colorant needed for per acre of athletic field using the higher recommended application rates would range from $200 to $500 an application, depending on colorant brand.

With seed prices currently a bit higher the past few years, using one of these products could save a field manager a bit of money when compared to overseeding. Overseeding also has added maintenance costs. Considering that overseeding will require ground preparation, seeding, watering, fertilizing, mowing, pest control, spring transitioning, etc.; colorants may be a significant labor saving alternative as well.

The painting process can be boiled down to pick/purchase a colorant, add water plus colorant to your sprayer, and begin spraying. Any type of sprayer will work, although a boom-sprayer would be much more efficient to apply. If the color is not even or dark enough, you can make additional passes to accommodate aesthetic needs. There is some clean-up, but no season-long care like with overseeding. Speaking of clean-up, be very careful to not get this product on anything you do not want green. Fences, goal posts, benches, protective padding, etc. will all absorb the colorant and may be permanently stained. Be sure to wear "old clothes and shoes" and I would recommend rubber gloves. Always use good judgment and wear personal protection equipment when using sprayers.

Depending on your field's use, there are a few other potential drawbacks to using a colorant. It does not provide a wearable playing surface like an overseeded grass. Once the dormant tissue is worn away, there is no regeneration until spring. So, the "wear factor" must be considered if you have a bunch of games or other events take place on your field during the winter.

THE RESEARCH

Over the past few years, we have conducted numerous studies at North Carolina State University to evaluate various colorant products. Our first detailed studies were applied to putting greens in fall 2008. Subsequent trials have included evaluations on bermudagrass and zoysiagrass at a great assortment of mowing heights. In total, we have evaluated more than 30 products. These products are from manufacturers/distributers such as BASF, Burnett Athletics, D. Ervasti Sales, Enviroseal, Geoponics, Harrell's, J.C. Whitlam Manufacturing, John Deere Landscapes, Milliken, Missouri Turf Colorant, Pioneer Athletics, Poulenger USA, Precision Laboratories, Solarfast, US Specialty Coatings, and World Class Athletic Surfaces. There has been a rapid increase in new products in the past 5 years in response to the growing interest in using colorants.

In the earlier studies we applied colorant treatments to completely dormant turfgrass in late October to early November using a boom sprayer at rates ranging from 40 to 160 gallons per acre (gpa). Applied to bermudagrass, colorant increased turf color from 38 to 67 percent

Table 1. Visual colorant quality ratings following the application of turf colorant on bermudagrass in fall 2012.

Colorant Name	Colorant Quality Rating			Initial Color
	Week 1	Week 5	Week 10	
Bermudagrass	3.4	1.0	1.0	Not Categorized
Endurant	7.9	7.0	1.8	Dark Green
Enviroseal Go Green	7.0	7.0	6.8	Yellow Green
Evergreen	8.0	6.8	3.9	Green
Green Dye Turf Colorant	7.0	7.0	7.0	Yellow Green
Green Lawnger	8.8	8.3	7.0	Green
Green Lawnger-Graphics	7.0	6.0	2.4	Blue-Gray Green
Green Lawnger-Lineman	7.8	6.6	4.1	Green
Kameelyan-Bermuda	7.0	7.0	6.1	Green Blue
Kameelyan-Blue	7.0	7.0	7.0	Blue
Lesco Green	8.4	8.0	5.4	Green
Mtp Turfgreen	7.0	4.3	1.3	Blue-Gray Green
Original	7.3	6.9	5.3	Yellow Green
Regreen	7.3	7.0	6.5	Green Blue
Solarogen	7.8	7.4	4.8	Blue-Gray Green
Southwest Green	7.8	7.6	1.8	Black Green
Southwestern	3.0	1.1	1.0	Dark Green
SprayMax	8.1	6.0	3.9	Dark Green
Sugar Hill	8.0	6.0	1.8	Black Green
Super Cover	4.3	1.6	1.0	Blue-Gray Green
Titan Green Turf	7.9	7.0	5.8	Green
Turf Cote	1.8	1.0	1.0	Not Categorized
Ultradwarf Plus	8.0	6.0	1.6	Dark Green
Ultradwarf Super	8.1	7.5	2.8	Dark Green
Wintergreen	7.0	7.0	7.0	Green Blue

Quality ratings are based on the color of the colorant on a scale of 1-9 with 1=straw brown to 9=dark green. Products categorized as Blue and Yellow Green had a maximum rating of 7.

▲ **Colorants applied** to Tifway bermudagrass (left) maintained beside next to tall fescue area (right).

relative to the control at the time of painting. Of course there was some variation in how the color was judged over time. But remember the saying, "beauty is in the eye of the beholder." Most of these products will have a date in which they will need to be re-applied to get season-long green color. Over the 6 years we have tested these products, some years the color lasted the full winter and some years it did not. On average the best products will have good color for about 75 days.

GOOD RESULTS ON SEMI-DORMANT GRASS

In another study when the products were applied to semi-dormant turfgrass, the products performed much better due to the greater background color at the time of application. This is a very important point. Subsequent tests have proven that some background color goes a long way. Applied to semi-dormant turfgrass, the color will look better and may last longer. For optimum results, do not wait until the turfgrass is straw brown.

Some of the colorant-treated turf took a bluish tint over time (some quicker than others). While this may sound like a negative attribute, in one survey many people did not mind the bluish color. Why blue? Well, often green is produced by mixing blue and yellow pigments. The yellow pigments are generally not as stable as the blue pigments so as the products age, the blue tends to be the more dominant color. We also found that most of the darker, more bluish products held their color longer than the products that started out a more natural green color. The more natural green products tend to fade to a grayish color as they age.

Applying the colorants at 160 gpa provided turf color increases up to 44 percent greater than the 80 gpa treatments. Applying colorants at rates above 80 gpa also resulted in increased color longevity over the winter season. We did not expect to see such a significant rate response in longevity of the products. More research is needed in this area to fully understand how to best use this information.

I often get asked, "What is the best colorant?" In fairness, no one turf colorant was clearly superior on both grasses in terms of natural green color at the time of application and at the end of the winter season. Results from our earlier studies generally indicated that the colorants with the best natural green color did not generally last as long as some of the others. This suggests that to have a natural green color for the duration of the study, reapplication will be necessary. A longer-lasting color, although it may have a blue-ish hue, can be achieved with minimum to no reapplication. ■

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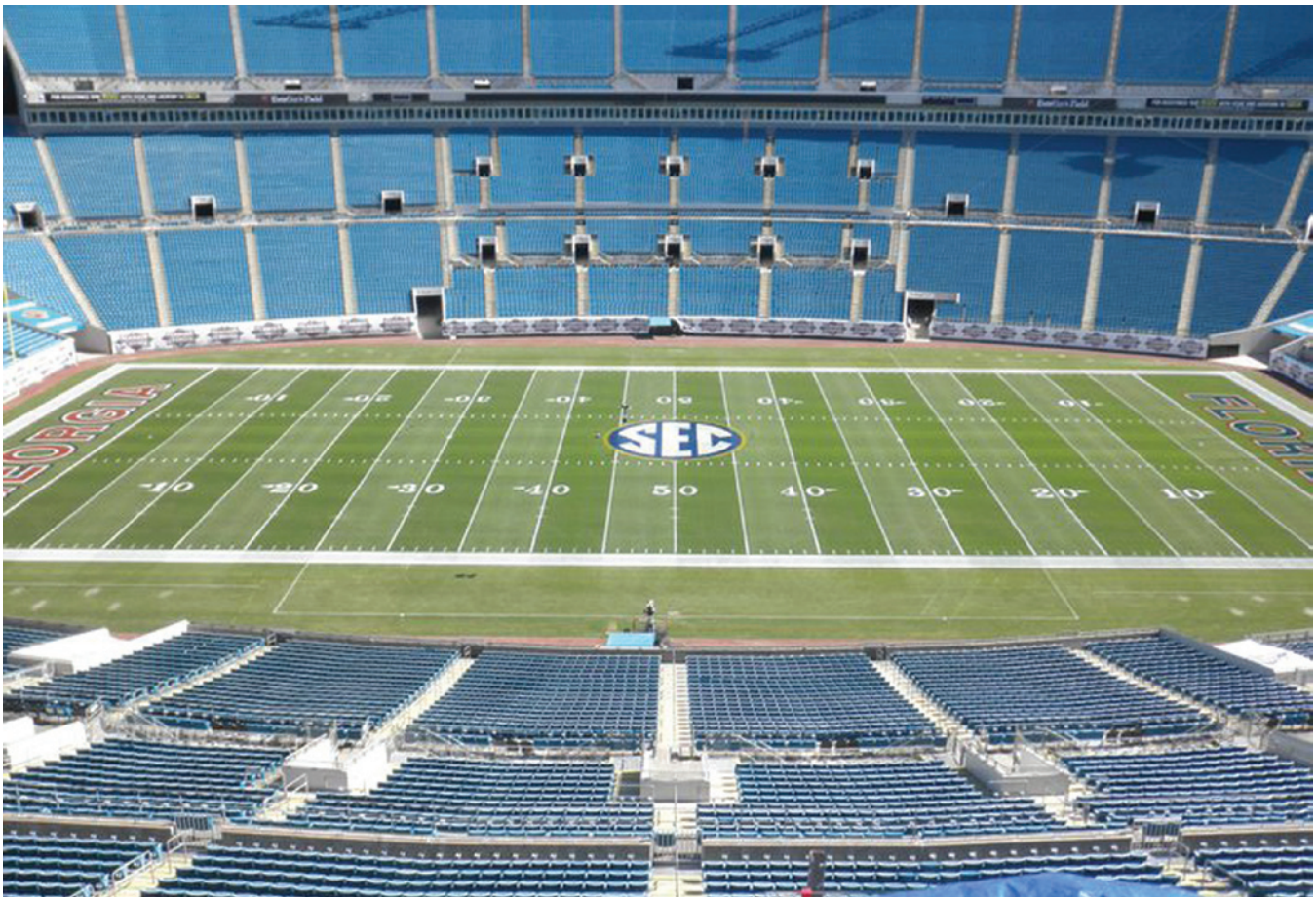
Maintenance of NATIVE SOIL compared to SAND-BASED FIELDS

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.

» 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.

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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