



Infield Soils and Topdressings

by Paul Zwaska

Editor's Note:

The following article is the first in a two-part series and was written in 1999 when the author was Head Groundskeeper, Baltimore Orioles.

Baseball is a unique sport in grounds management. It's the only major sport that is played on a field that has both turf and exposed soil for a playing surface. Ballplayers scrutinize the playability of your skinned areas more closely than you're turf areas. Your reputation as a groundskeeper will depend on the skin you keep.

This is not to say that the turf areas on a baseball field are unimportant. But if you think about it, 75% or more of the game occurs on the skinned areas of the field. Unfortunately, this crucial subject is avoided by the academic institutions that teach many of today's up and coming athletic field managers.

With no written guidance, new groundskeepers must resort to trial and error if they haven't been lucky enough to learn from another groundskeeper in the business.

GOALS FOR A QUALITY INFIELD SKIN

Traction: Most players desire the same quality in an infield skin: traction. That's the reason for the spikes in their shoes.

Nothing makes a player happier than a firm infield skin that is moist and cork-like, not hard and baked dry. The cleat should penetrate the skin and leave a perfect imprint. Very little soil should be disturbed or displaced. When players plant their feet to throw, field the ball, or run, the soil should not give way under them. The traction in your infield skin comes from its base soil. Choose your mix carefully. Many companies that sell infield skin mixes know nothing about their proper function.

Many mixes are too sandy. Soils that don't firm up (high sand content of 75% or higher) are more mobile. This creates

low spots in high-traffic areas (around bases and fielders' positions) more quickly, especially as the field dries out. The loosened material is more likely to be carried to other portions of the field to create high spots and huge lips at the infield skin/turf interface.

These sandy infield mixes increase infield skin maintenance problems. The loose soil also causes unstable footing for ballplayers, increasing the risk of foot, ankle, and hamstring injuries.

Drainage: The proper drainage on your infield skin dictates how quickly you will resume play after a rainfall. About 95% of the water that falls on the skin should run off the surface.

Good surface grade and proper maintenance techniques will give you the best results. Your infield skin should have a minimum 1-1/2-inch fall from the front of the skinned area to the back. Percolation rates on a good, firm infield skin should be 0.03 to 0.05 inches of rain

NATIONAL SEED PROFESSIONAL TURF PRODUCTS

Specializing in Quality
Grass Seed to Meet All Your
Turf Performance Standards

Call For a Catalog

800-828-5856

Carry a full line of quality mixtures
especially formulated for:

SPORTS & ATHLETIC FIELDS

LOW MAINTENANCE AREAS

GENERAL GROUNDS

GOLF, LAWN & RECLAMATION

Technical Agronomic Support and
Custom Blending Available

per hour. Only in rare, special problem areas should a sandy infield mix be used to help drainage problems.

Drainage lines installed under the infield skin are a waste of time. If you use the proper soil for the skin, it will never perk enough rain to reach the drain tile. A drain line is more appropriately positioned five to 10 feet behind the infield skin in the shallow outfield. Here it will capture water that runs off of the skinned areas.

Amending infield soils with various miracle materials to enhance drainage throughout the skinned area usually proves unsuccessful. At best, these amendments provide a very short-lived remedy.

Topdressing: Choose the proper topdressing to work with your base mix. Think of your skin as a two-tier profile: the top 1/4- to 1/2-inch consists of your topdressing, and the remainder consists of your base infield mix.

The topdressing on the skin provides a cushion for the players. It creates a buffer zone between the players' cleats and the moist base soil mix, and prevents the soil from sticking. The topdressing layer also helps you endure light rain showers during games.

Don't go any thicker than a 1/2-inch layer of topdressing on the surface of the skin. A deeper layer will cause the ball to skid under infielders' gloves instead of taking the proper hop. It can also drastically influence a ballplayer's traction.

INFIELD BASE SOILS

Testing: If you don't know the percent breakdown of sand, silt, and clay in your skin base mix, have it tested to give you a reference point for comparisons. Send a sample of your soil to a private testing lab or county extension office that performs particle size analysis or soil texture analysis work. These labs will give you the composition percentages, and they'll show you where your soil fits into the soil texture triangle. A simplified home version of the test is also available. It can give you a ballpark figure of your percentages.

There is a simple way to get an estimate of the percentages of sand, silt, and clay that are in your base mix. This experiment provides a nice, cheap way of checking

soils if you are looking around and can't afford to do a lot of testing.

DETERMINING SOIL TEXTURE

Step 1. Obtain a quart mason jar with a lid, like the ones used for canning. Fill it a little more than half way with the soil you wish to test. Fill the rest of the jar with water, and attach the lid tightly.

Step 2. Shake the jar vigorously for a couple of minutes to fully separate and wet the soil. There should be absolutely no lumps of soil left when you're finished agitating it.

Step 3. When you feel that the soil is fully dispersed in the solution, set the jar down and begin timing. After 45 seconds, mark a line on the side of the jar with a grease pencil or White-Out where the top of the layer of sand has settled out in the jar. Next, put a mark at the top of the next layer after three hours have passed; this is your silt layer. After 24 hours, your clay will have settled out as well.

Step 4. Measure the total depth of soil in the mason jar. Then measure the thickness of each of the three layers using your marks on the jar.

Step 5. Calculate the percent of sand, silt, and clay in your soil sample with the following procedure:

1. Divide the thickness of the sand layer by the total depth of the soil in the jar.
2. Follow the same instructions for both the silt and clay layers.
3. Multiply each of the three figures by 100, and you will have the percentages of sand, silt, and clay in your sample.

Step 6. You can now check the soil texture triangle to see where the intersection of the three values places you on the triangle (see Figure 1). Remember that this is an estimate. If you need a more precise test, it is worth your while to have a professional test done by a private lab or a county extension office.

Soil testing labs use a couple of different quantitative methods to determine relative amounts of soil separates. Once the relative amount of sand, silt, and clay are known, you can determine the soil's textural class using the soil texture triangle provided. Each side of the triangle represents the relative content or percent of one of the three soil particle size classes.

General Guidelines: Remember that soils differ greatly around the country and they react differently to many things. The following gives generalizations as a guide for base mixes. Soils in your area might not always fall into these guidelines.

You want to keep the sand fraction of your base soil between 50% and 75% (normal base mix). Soils with higher sand content normally become too loose and mobile. The soil becomes loose with play and is transported to other areas of the skin by the dragging process or by play.

You may think you'll gain drainage if your base mix has high sand content. In fact, it creates more maintenance headaches.

The mobile soil rapidly develops high and low spots in the skin, and lips at the skin/turf interface. Those low spots and high lips interfere with the surface flow of rainwater draining off the skin, and large puddles develop.

In base mixes with higher sand content (> 75%), there is not enough binder (clay and silt) to hold the soil firmly together. As a game progresses, the skin becomes more loose in the high-traffic areas. This reduces traction and increases risk of injury to feet, ankles, and hamstrings.

Continued on page 12

Dual Slope Laser Grading



- Automated dual slope
- Accurate to .125" (1/8")
- 1 day service available
- Complete athletic field construction
- Bonded and insured
- Local references

Georgia Golf Construction, Inc.
1441 Route 50
Woodbine, NJ 08270
Tel (609)-628-2597 or (404)216-4445
Fax (609)-628-3087

www.georgiagolfconstruction.com

Increase your field's drainage and playability.

Soil texture affects many properties of soil. Compactability, porosity, bulk density, water-holding capacity, and drainage are all affected by the makeup of the soil.

Soils high in sand normally hold very little water and drain rapidly. Soils high in clay normally hold large amounts of water and can drain variably, depending on structure.

Soil texture refers to the percentage of sand, silt, and clay particles in a soil. These particles are defined by their size.

To tighten up a high-sand base mix, till in a nice clay loam soil. Add several tons at a time, till it, work it, let it settle, and pack and see how it reacts before you add more.

High-clay and high-silt soils create a different problem: compaction and hardness. Generally speaking, the combination of these two materials should not exceed 40% to 50% of your soil mix. Too much of either of them can inhibit intake of water into the skin due to lack of pore space from compaction.

The result is a hard field that is unable to take up moisture to help soften it. The best solution is tilling in calcined clay to help reduce compaction and increase pore space. But be careful not to blend in too much material.

Again, add your calcined clay by a couple of tons at a time. Till it, work it, let it settle, and pack and see how it reacts before you add more. The alternative is to replace the base mix with a new mix.

Rocks and pebbles in an infield base mix can be a major problem. Your base soil should be able to pass through a 1/4-inch screen, or at the very least a 3/8-inch screen, to eliminate any rocks or pebbles.

For Oriole Park at Camden Yards, I use a 60% sand, 20% silt, 20% clay base mix. This translates to a borderline sandy loam and sandy clay loam. I've used it since the day we moved here. It's a very stable soil with little mobility. Low spots on my infield are rarely a problem, but that is also partially due to the management of the skin.

The lesson to be learned here is don't just pick any old soil for your base mix. Know what you are getting by asking for a soil particle size analysis.

And whatever you do, don't purchase a mix just because some salesman says that he has "x" ballclub and "y" ballpark using it. Most of those people have zero knowledge of what kind of soil creates the best infield skin.

INFIELD TOPDRESSINGS

In general, there are four types of topdressings on the market today. Calcined clay is probably the most widely known.

Calcined Clays: Quality calcined clays are usually made from the montmorillonite family of clays. They are fired to about 1200 degrees, a point where the clay particles become stable. Stable particles will not become soft or melt into a slimy clay when wet. Instead, they

Continued on page 14



Dr. Henry W. Indyk Graduate Fellowship in Turfgrass Science

As many of you know, the turfgrass industry lost a dear friend and colleague in September 2005. We will all miss Henry very much and would like to insure that his legacy lives on. The Indyk family would like to establish a memorial fellowship to support graduate students interested in applied turfgrass science. This fellowship is being created to help assure that tomorrow's graduate students have the financial resources to get an advanced degree in turfgrass science at Rutgers University. To fund a full graduate assistantship each year in Henry's name, we will need to raise a total of \$400,000. Your generous support at this time will bring us closer to reaching this goal.

To make a tax-deductible contribution today, please send a check payable to the Rutgers University Foundation, 7 College Avenue, New Brunswick, NJ 08901. Be sure to indicate "Indyk Fellowship, Turfgrass" in the memo portion of your check. If you desire, you may provide a donation in the form of a pledge payable over several years.

For information on other ways to support this fellowship, please contact

Dr. Bruce B. Clarke, Director – Rutgers Center for Turfgrass Science
(732) 932-9400, ext. 331; or clarke@aesop.rutgers.edu or

John Pearson, Director of Leadership Gifts at the Foundation, by calling
(732) 932-7899 or email: pearson@winants.rutgers.edu



**Fertilizers/Seed
Plant-Protectants
Soils/Sands**

The Turf Trade

517 Franklinville Road
Mullica Hill, NJ 08062

856-478-6704

Alan Phillips 609-226-9303
Steven Segui 302-354-7209
Michael Nicotra 856-472-2733

www.theturftrade.com

maintain their original shape and hardness. The firing process evaporates the moisture in the micro pores of the clay particles, making them extremely absorbent. Particles will release absorbed moisture, but at a slower rate. Calcined clays work exceptionally well as a topdressing for high-sand infield mixes. The firing process gives the clay particles a light bulk density. This prevents too much clay from sinking into the sandy soil. It also helps hold moisture at the surface. Normally, large pore spaces in high-sand base mixes allow gravity to pull moisture out.

Calcined clay also works on normal infield mixes, but at times it can hamper field preparations after a rain. Particles that are on the field when rain comes absorb the water to their field capacity. When you're trying to dry out the skin, the particles continue to release moisture. You have to add more calcined clay to the field to dry it up, and suddenly you have too much topdressing on the skin.

Vitrified Clay: Vitrified clay topdressing is made from the montmorillonite and illite clay families. These clays are fired to 2000 degrees, causing the particles to expand. The process

creates macropores and reduces the amount of micropores. Thus, the vitrified clays absorb much less water than a calcined clay. If you're looking for absorption, the finer grades will work a little better than the coarse grades.

Vitrified clay topdressings are not to be used on infield base mixes with high sand content. Vitrified clays have a heavier bulk density than calcined clays, and the topdressing will sink fairly quickly as it is agitated by play and regular maintenance.

However, vitrified clays work tremendously well on normal or high-clay/silt infield base mixes. They can be used straight, but they work even better when mixed with a calcined clay in approximately a 60:40 or 70:30 vitrified to calcined ratio.

Vitrified clay in these base mixes creates a buffer zone between players' cleats and the infield base mix. This allows you to wait a little longer before you cover the field for a light to moderate rain. Vitrified clay sheds water as it gets wet. It allows the water to roll through to the base mix until it has absorbed all that it can handle. Any excess water will run off if

the grade on your infield is correct. A small amount of calcined clay in your mix will help increase your water holding capacity a little.

Unlike calcined clay, vitrified clay won't absorb water to field capacity and extend your drying time by releasing the moisture.

Because of its lack of moisture-absorbing micropores, vitrified clay products will not work as a drying agent during a game. Also, it's not highly recommended as a soil amendment for tilling into your base mix.

Crushed Aggregates: The third type of topdressing material, crushed aggregates, combines various crushed stone products with crushed brick. These materials absorb minimal amounts of water, and they have a heavy bulk density.

Again, because of the bulk density, crushed aggregates should not be used on any high-sand base mixes due to rapid migration down into the mix. They can be used on normal infield mixes, and even high-clay/silt mixes, but only as a topdressing.

Continued next page

EVERGREEN™ Turf Blankets... ...trusted around the world!

"Results Outstanding...
Could Not Believe..."

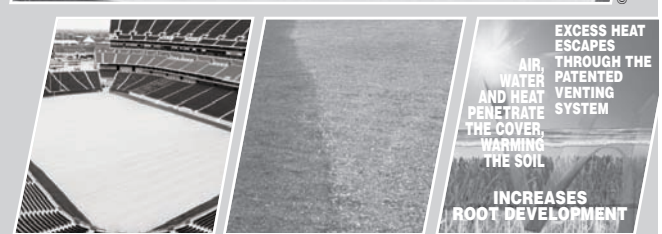
wrote **Dann Daly**, Park Maintenance Supervisor,
Parks & Recr. Dept., North Smithfield, RI

- Earlier spring green-up
- Faster seed germination
- Deeper root development
- Delays dormancy in fall
- Ideal winter blanket
- 3, 7 & 10 yr. warranty covers
- Best for quick turf repairs
- Available in any size

Want to know more?
CALL TOLL FREE
1-800-387-5808

COVERMASTER™
COVERMASTER
COVERMASTER
MASTERS IN THE ART OF SPORTS SURFACE COVERS

COVERMASTER INC., 100 WESTMORE DR. 11-D, REXDALE, ON, M9V 5C3 TEL 416-745-1811 FAX 416-742-6837



Covers for football and soccer fields are also readily available. Covered... Uncovered... It works on the greenhouse principle, every time!



covermaster.com
E-MAIL: info@covermaster.com

These topdressings perform better when enhanced with some calcined clay. Don't till these materials into your mix, or you may eventually wind up with something similar to concrete.

Diatomaceous Earth: The fourth and final topdressing material is diatomaceous earth. It's made of sedimentary rock composed of fossilized skeletal remains of diatoms (microscopic, single-celled plants). The material is very high in silica (between 86% and 94%). During processing, it is crushed, dried, and calcined to remove any organic contaminants. It becomes a very porous product that can absorb large amounts of moisture.

Diatomaceous earth works well for drying a field after rains, but it's very expensive and creates several major problems. First, it has a very light bulk density. This allows it to easily blow off your field in the wind, causing major problems with lips where your skin meets the turf edge. Also, when incorporated into the soil, diatomaceous earth tends to float back to the surface in time. It breaks down very rapidly from friction wear (dragging the infield). And finally, due to the high content of silica, it has a funny color and has shown some problems with glare on sunny days. For Oriole Park at Camden Yards, we currently use a mixture of 80% vitrified clay and 20% calcined clay as a topdressing for our infield. We maintain approximately a 1/4-inch layer of topdressing on our skin areas.

MAINTENANCE ISSUES

Base Mix: Here, the key is moisture, moisture, moisture.

Moisture is what will give your base mix the corky feel that the players desire. Try to keep your infield skin as moist as possible. Soak the skin deep in the evening after the last game has been played. It then has all night to perk as deep as it can into your mix without evaporation stealing too much away from it.

During the daytime, add water as time and weather dictate. I can't stress enough how important it is to keep your field moist as long as possible. When it dries out, it takes a long time to reestablish a good moist base again.

If your base mix is getting too tight or hard, you might decide that you want to open it up to introduce some pore space into it. You want to till it; I prefer to save rototilling for

when I'm adding an amendment to the soil mix and I want to mix it really well. Otherwise, I think a rototiller adds too much air to the base mix at one time. You have to spend too much time with a roller trying to firm the base mix back up.

I like to use a greens aerator to open up my infield mix. It increases pore space while maintaining most of the integrity (firmness) of the base mix. Unless you want to use it to amend the base mix, scrape off your infield topdressing or pull it to the side before you start.

I might go over it once or twice, depending on how much pore space I want to create. Always soak the infield the night before, or do this procedure after a rain so the skin base mix is not hard and dry. Moisture will determine this method's success. Of course, you still re-roll the skin once you've dragged the infield after this operation.

One caution: never till or aerate your skin with the intention of leaving it open to help moisture soak deep. I have seen too many people end up with a quagmire because of this. Always roll your base first before adding water. There will still be plenty of pore space left.

When I open the skin with an aerifier, I usually re-level my infield skin mix at the same time. When you are re-leveling your skin, you are basically rechecking the grade of the base mix from front to back to ensure that it's a smooth grade with no high or low spots.

When doing this, it's important to have your topdressing removed to allow the soil you add to properly adhere to the existing infield base soil. A nice, deep spiking of the skin

works well to loosen the top inch or so to make it easy to cut down high areas. It also allows any soil you add to low areas to mix and bind better with the existing base mix.

You should re-level your infield at least once a year, and twice if it receives year-round play. At Oriole Park, we level our base mix three to four times per season. Frequency should be based on how mobile a base mix you have, the level of activity the field receives, and your manpower and time availability.

RE-LEVEL YOUR SKIN PERIODICALLY TO PREVENT DRAINAGE PROBLEMS CAUSED BY HIGH AND LOW SPOTS.

Re-leveling allows you to cut down any high spots and fill any low areas. These areas can develop for two reasons: high concentrations of play (around bases and players positions), and dragging/grooming patterns you use on the field.

We check our grade by running a tight string line from the turf edge at the front of the infield to the turf edge at the back of the infield. It's important to remove any lips at the turf's edge before you run your string lines, since they can seriously throw off your grade reading. Roll and soak the base once you've completed the re-leveling project.

Topdressing: When you initially put your topdressing over your base mix, it should be spiked into the top 1/2 to one inch of the base mix. Once you're finished working this in, drag it and water it. Adjust your topdressing application so that you have about 1/4 to 1/2 inch of loose topdressing on top, and maintain that throughout the season by replenishing when necessary.

Continued on page 17



Service ♦ Technical Support ♦ Quality Products

Lawn & Sports Turf:
973-252-5455
Fax:
973-252-2881

For ALL your turf and field care needs



See our full product catalog @

www.GrassRootsTurfOnline.com

STENCILING

Continued from previous page



Field Marking Paint: Paints consist of liquid (or solvent), color (or pigment), sticker (or binder) and other additives such as a fast drying agent. Sports field marking paints are usually water based latex acrylics. Petroleum distillate based paints or volatile organic compounds (VOC paints) can be injurious to plant tissues. Field marking paint is available the forms of aerosol spray paint in inverted cans and bulk paint in 1-5 gallon pail containers. Bulk paint may be premixed ready to use or it may need to be diluted with water in some ratio.

Painting Equipment: The most basic field paint equipment is the paint brush and roller, simple and effective but time consuming. Many sports field managers with only a few sports fields use the inverted aerosol spray paint can holder machine. This is a tool that no sports field manager should be without. It is helpful for touchups, for painting contrasting colors quickly and as a backup for when the primary paint machine breaks down. Most sports field managers use some form of a powered paint machine. These include sprayers ranging from a CO2 tank units to gasoline powered compressor or pumps to electric pump models. Push, self propelled and riding paint machines are available. Be sure that your machine is kept clean; in good repair and have spare parts are on hand.

Preparations for painting: For best results, mow the turf (at least where the lines are) before painting. In dry weather, avoid painting right after mowing unless you give the turf some water. This will help prevent a burning effect. Avoid painting wet grass. Paint does not adhere well to wet grass. To remove dew, connect two 100 foot water hoses and with a person on each end, start in the end zone and drag the hose the length of the field.

Paint Can Tips: Before shaking, tap the can with your hand to gently break the marble loose, then shake vigorously to thoroughly mix the paint. If you store aerosol cans upside down, it will make it easier to break the marble loose. Avoid temperature extremes. In cold weather, fill a 5 gallon pail with hot water, and put the aerosol cans in to keep them warm. Some brands of spray paint have adjustable tips on the can that can rotate to make a wide or narrow line.

Mixing Paint: Dilute (if necessary) your paint per the paint or sprayer manufacturers recommendations. Mix paint by pouring bucket to bucket, or, use a drill powered mixing device or use a bulk paint dispenser with agitation mixing. For best results, always strain the product before adding to the paint sprayer.

Paint Application Tips: Always string your lines for the best results. If you are painting lines on dry infield dirt, first moisten the dirt with water. This will prevent the paint beading up in the dust. Remember that when painting lines, your gait will influence not only the quality of the line (straightness, brightness and width) but also how much paint you will use.

Continued on page 18

Infield Soils and Topdressings

Continued from page 15

Spike your infield on a regular basis to smooth out cleat marks and other imperfections. You shouldn't have to cut deeper than 1/2 inch. Follow-up by dragging and watering the skin. Again, keep that skin moist as much as possible during the season.

Special pure clays are used in the batter's boxes, catcher's box and the pitcher's landing area. Topdressing these areas takes a little more care. This clay is chewed-up by cleats and eventually spread around into the topdressing, so it's a good idea to sweep off and replace this topdressing on a regular basis.

When that clay mixes with the topdressing, it inhibits the flow of moisture and makes the topdressing very sticky. This makes it hard for deep watering of the mound and home plate skin areas. At Oriole Park, we usually replace ours after every third game.

If you use dry line chalk to mark your foul lines and batter's boxes, it's a good idea to scoop up what's left of the lines after the days games. This will prevent the chalk from becoming part of your skin mix, which can cause discoloration, a change in your soil texture over time, and a decrease in the flow of moisture into the base mix.

Finally, as you head into winter, when the field will be unused for several months, either scrape the topdressing off the field and remove it, or create a catch basin an inch or so deep in the skin wherever the skin meets the turf. This prevents large amounts of topdressing from blowing into the turf edge and creating large lips during the windy months of winter. Here at Oriole Park, we do both as a good preventative maintenance practice for lips.

Remember, these are just guidelines to help you make better decisions when building, renovating, or maintaining an infield skin. There are many variables, especially when it comes to soils.

It's the responsibility of each groundskeeper to know what makes an ideal skin and to apply that knowledge. Use the resources available to you. You may not have the time or dollars to create the perfect skin infield, but you can't improve what you have unless you know what you're working towards.

Paul Zwaska is General Manager, Beacon Athletics, Middleton, WI.; and Member, Sports Turf Managers Association (STMA)



William Mast
Steve Thompson
Office: 610-327-3390
Fax: 610-327-0581

1486 S. Hanover St.
Pottstown, PA 19465
www.aer-core.com
office@aer-core.com

Turfgrass Services
Equipment Sales