HOME TEAM ADVANTAGE

B-BP-4 BALLPARK-4 GROOMER

B-DM-6 DIAMOND MASTER®

When the safety of your players comes first, look to Bannerman, the leading Groomer manufacturer for over 24 years, to shape, level, and care for your baseball diamonds, warning tracks, and walking/bike trails. The B-BP-4 Ballpark-4® (shown) and the B-BP-6 Ballpark-6®, B-DM-6 Diamond Master® (shown) models have five standard tools, including: Ripper Blade, Rake, Leveler, Roller, and Brush. Accessories available include: Wing Brush Kit, Top Link Kit, 50-gallon Water Tank Kit with spray nozzle, and NEW Highway Transport Kit. Restore your diamond's luster in 20 minutes or less with one of the industry's leading groomers.

New to the Bannerman family of groomers is the B-MG-6 Master Groomer. This brush unit is the "Quick and Slick" answer to working in light to heavy topdressing and other turf building materials down to the base of the grasses, that you've only dreamed of, until now. For use on greens, tees, fairways, and all types of sportsturf surfaces both synthetic and natural.

B-MG-6 MASTER GROOMER

BaNNerman

THE HOME OF SPORTSTURF MAGIC

41 Kelfield Street, Rexdale, Ontario, Canada M9W 5A3
CANADA 1-800-325-4871
USA 1-800-665-2696
www.sportsturfmagic.com

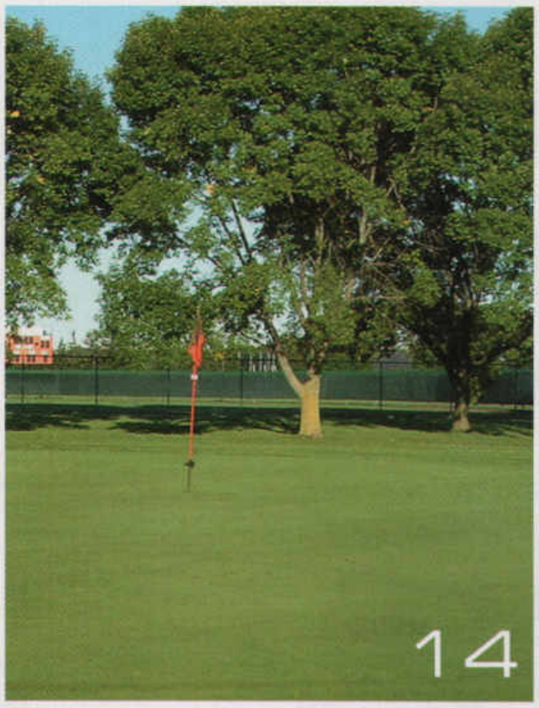
Circle **130** on card or www.oners.ims.ca/5062-130

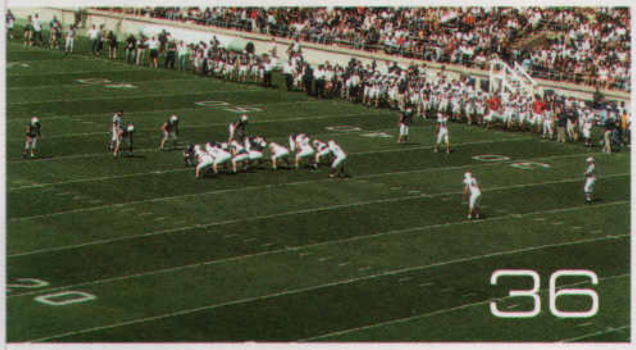
GREEN... AIN'T IT?
TWO-TIME WINNER "SPORTS FIELD OF THE YEAR"
MICHAEL W. SULLENBERGER
GAMEDAY, INC.
"Geroge Mason University's stadium soccer and baseball fields have both won the Sports Turf Managers Association Field of the Year Award. And, a big part of these victories has to do with K-Rain. I use K-Rain for one reason and one reason only. I demand the best. The K-Rain ProSport works, period. Nothing in the industry provides better coverage. The ProSport performs and it's built rock solid."
"Quality and reliability sold me on K-Rain. I expected that. Their customer service took me by surprise. There is no comparison to the K-Rain experience. No one does it better. I won't use anything else."
Call 1-800-735-7246 for more information, free demo and to find the K-RAIN Distributor nearest you.
K-RAIN ProSport® ... Simply the Best
1.800.735.7246 | www.krain.com
© K-Rain Manufacturing Corp.
Circle 131 on card or www.oners.ims.ca/5062-131
K RAIN®
IRRIGATION SOLUTIONS WORLDWIDE™

football issue

JULY 05

VOLUME 21 / NUMBER 07





features

departments

ON THE COVER: Nittany Lion faithful cheer on their team. Photo by Steve Manuel/manuelfocus.net.

SPORTSTURF (ISSN 1061-687X) (USPS 000-292) (Reg. U.S. Pat. & T.M. Off.) is published monthly by Adams Business Media at 833 W. Jackson, 7th Floor, Chicago, IL 60607. **POSTMASTER:** Send address changes to Sportsturf, P.O. Box 2120, Skokie IL 60076-7820. For subscription information and requests, call Subscription Services at (847) 763-9565. Subscription rates: 1 year, $40 US & Poss.; 2 years, $65 US & Poss.; 1 year, $65 Canada/Foreign Surface, 1 year, $130 Airmail. All subscriptions are payable in advance in US funds. Send payments to Sportsturf, P.O. Box 2120, Skokie, IL 60076-7820. Phone: (847) 763-9565. Fax: (847) 763-9569. Single copies or back issues, $6 eachUS/Canada; $9 Foreign. Periodicals postage paid at Chicago, IL, and other mailing offices.


Play hard.
Land soft.

Construction specs 101

Time really does go by faster as you age. It's difficult to believe that July is here already, which means time for our annual Football Issue. Of course softball or soccer or lacrosse (America's next big game?) contests are still being waged on many readers' football fields. Raise your hand if you have worked your plan to assure some "down time" for that turf before the gridders start tearing it up.

Last spring Tony Strickland, CSFM, sent me a list of construction specifications for football and soccer fields. Tony's company builds athletic fields; he also has built and managed a large sod farm, and has built several large athletic field complexes in the southeast. Here are some of Tony's definitions and product descriptions:

Topsoil: Friable surface soil, if included, which is reasonably free of subsoil, rocks, stones, sticks and other debris more than 2 inches in diameter and without weeds, roots and other objectionable material.

Sub-surface soil: That soil directly below the topsoil being existing in place soil and/or properly compacted imported soil, both being stable as a supporting medium and acceptable as a part of a rootzone for Sports Field Contractor.

Sand: USGA Greens sand or sand meeting the USGA specification per particle size analysis, or pre-approved sand.

Lime: Dolemetic lime, stone ground to meet agricultural standards containing a minimum of 85% carbonates.

Fertilizer: A commercial mixed grade fertilizer including 100 lbs. of nitrogen, 200 lbs. of phosphorus and 300 lbs. of potassium.

Rootzone: The combination of topsoil, sub-surface soil, sand, lime, and fertilizer lightly blended into a loose homogeneous mixture; the sand being approximately 85% of the mixture.

Sod/Sprigs: [For example] certified Tifway II Hybrid Bermudagrass produced under the rules and regulations of the Georgia crop Improvement Association, Inc. The sod/sprigs shall be harvested from vigorously growing, properly fertilized field(s) with at least one full growing season before harvesting. Sod shall be harvested in 30-inch width rolls or larger and the harvest netting shall be removed upon installation.

Warranted: The specific area(s) of sod harvested and sod installed during the dormant season that later does not demonstrate reasonable re-growth of stolons to sufficiently re-establish an acceptable playing surface; therefore, is subsequently replaced by the Contractor at no cost to the Owner.

Laser Grading: Shall include the use of a land leveler that is equipped with a laser controlled hydraulic system that automatically raises and lowers the implement. An agricultural type tractor to reduce compaction shall tow this implement. Laser grading shall be a multiple step process beginning with the sub grade and continuing with each layer of amendments including the topsoil layer (if included), sand layer and the final rootzone. Each of these four (4) individual layers will require a laser grading process and will meet the following degrees of variation to desired slopes and elevations: the sub grade +1/2 inch, the topsoil layer +1/2 inch, and the finished surface grade +1/4 inch.

ERIC SCHRODER, EDITOR

Comments always welcome.
Call Eric at **717-805-4197**,
email **eschroder@aip.com**,
or write P.O. Box 280, Dauphin, PA 17018.

SPORTSTURF®

833 W. Jackson, 7th Floor, Chicago, IL 60607
PHONE 312-846-4600 FAX 312-846-4638
WEBSITE http://www.greenmediaonline.com

THE OFFICIAL PUBLICATION OF THE SPORTS TURF MANAGERS ASSOCIATION

Prior planning and prudent preparation

We are in the middle of the summer season, but fall is just around the corner. As with many parks and recreation departments, our summer baseball and softball are very popular programs. As sports turf managers, we believe that proper playing conditions and maintaining fields is extremely important and we seek to provide the best and safest sports fields to our customers. Sometimes, the unpredictability of spring weather may not allow us sufficient time to complete the extensive work to get our fields into the best playable condition.

I personally have been faced with many challenges from this summer season: an infield that I've had to cancel after a rain because of the inability to remove excess water, a field with worn turf areas, and another with lip build-up. I am preparing a plan now to correct these in the fall.

Fall is prime time for turf cultural practices and for field renovations. Fall renovations are planned at season's end to repair or improve those nightmares from the summer season. Now, during mid-summer, is the time to prepare and communicate your intentions and expectations to coaches, athletic directors, your employer, and your staff. Develop a checklist of items with projected start and completion dates of field renovations and/or improvements you need to undertake. Communicate what the results will be after you complete these fall field renovation projects.

Your STMA Board of Directors is meeting this month and is also planning for many fall and winter projects. We have a full slate of items to discuss so our prior planning and prudent preparation will result in a successful association.

Dr. Dave Minner will be outlining the education topics and speakers for the 2006 Conference. Addressing the overall organization of the conference will be Mike Andresen, CSFM, and together with Boyd Montgomery, CSFM, they will present the Conference budget. Five subcommittees and the Finance and Audit Committee assisted the Conference planning.

George Trivett, CSFM, will be leading discussion on our STMA scholarship philosophy and Lance Tibbetts, CSFM, will report on several recommended changes to the certification process from the Certification Committee.

The Nominations Committee Chair Bob Campbell, CSFM, will report progress on the STMA Board Nominations process. The Membership Committee and its three subcommittees, led by Lynda Wightman with board liaison Vickie Wallace, have been strategizing on membership growth and retention. Vickie will be bringing those committees' recommendations to the meeting for further discussion and action. The Board plans to look at our mission to be certain it is still on target, and we will review our strategic plan to look at progress and set additional milestones.

These are a few of the items that we will be discussing. This continual planning and preparation is very important to our association so that we can build strong programs and services that will help our members achieve success.

Mike Trigg

MIKE TRIGG, CSFM

mtrigg@waukeganparks.org

Microbes in soil and sand-based rootzones

BY **DAVID A. ZUBERER**

Throughout my career as a university researcher and teacher, I have studied microbes in soils from a number of viewpoints. Mostly my interests have been focused on the roles of so-called beneficial microbes in soil-plant systems ranging from agricultural fields to reclaimed surface-mine sites. More recently, perhaps because of an interest in golf, but perhaps more so because of the need for basic information for turfgrass managers (my job brings me in contact with many students aspiring to work in the sports turf arena), our studies have focused on some of the microbiological aspects of sports turfs on native soils as well as those established on sand-based systems.

As I read various publications, from trade magazines to information on the World Wide Web, I find that there is a wealth of misunderstanding and misconceptions among the general public regarding not only the real functions of soil microbes but also of what it takes to maintain or manipulate them. To read some of the material "out there" one would think that agriculture, including turf management, has been waging "all out" chemical warfare on soil microbes and that we have all but annihilated them in our soils. To try to bring some clarity to the subject, I would like to discuss some of the issues surrounding soil microbes in turf with special reference to sand-based root zones, as that seems to be an area of some confusion.

I would like to address the following questions:

1. Are native soils and sand-based rootzones different?
2. What microbes are in sports-field soils?
3. How many are there? How much biomass?
4. What do they do?
5. What do you need to do for them?

I will try to provide some relevant information from the standpoint of what we know about soil microbes and their activities and I will try to indicate areas where the science is still uncertain.

Are native soils and sand-based root zones different? To some, this is obvious; there are differences in the two systems! But let's take a look from a microbiological perspective. Some of the major ways in which soils and sand-based root zones might differ are listed in Table 1. It is likely that native soils will have a greater content of silt and clay than a sand-based root zone as that is one of the principal reasons for developing the sand base; it cuts down on the finer particles and leads to coarser (more sandy) textures with the presumed advantage of better aeration and drainage. It is also likely that native soils have better aggregate-forming potentials than the coarser sands.

Thus, if managed properly, native soils can exhibit good drainage and will likely have a more variable range of pore sizes. Pore size is critical for air and water retention and finer textured soils, if not well aggregated, tend to drain poorly making the soil environment less suitable for microbes and roots. One might envision that the chemical properties of soils would be more complex than those of the sands although many different ingredients, e.g., zeolites or diatomaceous earth, have been added to sand mixes to improve their chemical properties (cation exchange capacity, etc.).

One might also expect that native topsoil would have more organic matter than a sand mix and that it might be more complex in its chemical composition. Sand-based systems are generally constructed with peat or some other organic material (for example rice hulls) making up as much as 20% of the mix. One should realize that sand-based systems can also accumulate new organic carbon fairly quickly in the surface few inches as roots and microbes grow, die off and decompose. Thus, grasses in sand-based systems become sources of microbial substrates relatively quickly in their early development.

Table 1. Some major characteristics that differ between native soils and sand-based root zones

	Native Soil	*Sand-Based*
Texture	Varies but likely to have silt and clay	Sand of specified particle-size range
Structure	Probably aggregated with a mixture of pore sizes. Mechanical properties may deteriorate when wet	Probably lacks aggregation; pore size less variable. Better mechanical properties than soil when wet
Drainage	Variable, mix of pore sizes. Better water retention. Drainage can be poor depending on texture and structure	Rapid drainage, pore space mostly due to packing of the larger sand particles. Water movement retarded due to perched water table
Chemical properties	More complex, greater cation exchange capacity due to clays properties derived mainly	Less complex; lower cation exchange capacity. Chemical from the organic matter content
Organic matter	Probably greater and perhaps older; more humified	Can be quite high in surface few inches. Different composition during early stages

What microbes are in sports-field soils?

Sand-based rootzones contain abundant populations of bacteria and fungi as well the other major microbial groups; actinomycetes (a specialized group of mostly filamentous bacteria and well known for their ability to produce many of our modern, medically useful antibiotics), algae (and cyanobacteria, formerly known as the "blue-green algae") and protozoans. Bacteria and fungi generally dominate the soil microbial population and this is probably true of sand-based root zones as well (see Table 2). It probably is not inaccurate to say that we know less about the microbial ecology of sand-based rootzones than we do about "normal'" soils. But that is changing as more research efforts are focused on these highly managed systems. However, what we do know is that they tend to function like regular soils once vegetation is established and regularly maintained as a healthy turf. Numerous studies document the abundance of microbes in sand-based turfgrass systems and they indicate that microbial numbers equal or exceed those of turf growing on various soils. Thus, one might expect that microbes in sand-based systems would behave like their counterparts in soil-grown turfs.

The major role of the bacteria and fungi is to decompose organic materials in the rootzone mix (or soil), including the cells of their recently dead microbial colleagues. It is precisely this turnover of root tissues and microbial cells that releases organically bound N and P as plant-available, inorganic ("mineral") forms. This

so-called mineralization process is the essence of what soil microbial activity is all about. Yes, they do bring about other important processes, some beneficial and some detrimental, but their primary benefit is to decompose organic materials, make more microbial cells and synthesize some soil organic matter (humus) along the way. This is why we can use mulching mowers and return grass clippings and the nutrients in them back to the soil where they belong.

Algae and cyanobacteria occur in very small numbers unless a soil is kept overly moist. They can be a problem on closely mown turf, like putting greens, where they may form slick spots if they are not shaded out by the grass canopy. More often than not, they are only problematic in very wet soils. On the other hand, in arid soils they represent a source of new organic matter albeit a relatively small one.

Protozoa probably deserve more research attention in turf systems. Grass roots generally support abundant bacteria and that is where you'll find the protozoa. Soil protozoa are effective "grazers" of soil bacteria and other microbes. In fact, this may be their most important role. By eating bacteria, they not only keep a check on the size of the population but they speed up the rate at which nutrients locked up (immobilized) in those microbial cells are recycled (mineralized) for uptake by plants and other microbes.

Table 2. Numbers and biomass values for the major groups of microbes found in soil

Microbial Group	*Biomass (Wet wt. in lbs/ac; 6" depth)*	*Number per Gram of Soil*
Bacteria **Actinomycetes**	300-3,000 300-3,000	10 Million - 1 Billion
Fungi	500-5000	10 Million - 100 Million
Algae and Cyanobacteria	10-1500 (Bloom*)	100 - 1 Million (Bloom)
Protozoa	50-200	1000 - 100, 000
Viruses	???	10 Billion - 100 Billion

**A bloom is a visible overgrowth of algae on the soil surface.*
Alexander, 1977, Sylvia et al., 2005

How many are there; how much biomass?

There are countless microbes in soils and literally tons of microbial biomass in normal, healthy turfgrass systems, including sand-based systems. Grasslands have long been known to support large populations of soil microbes. Some figures for numerical abundance and microbial biomass of various microbial groups are listed in Table 2. For perspective, one gram of soil is about the size a kidney bean in the palm of your hand.

But what about numbers of microbes in intensively managed, sand-based, sports fields? Are the populations somehow compromised? Research suggests that the answer to this question is, No! Results from multi-year monitoring of microbial populations in sports fields at Texas A&M University showed that bacteria consistently number in the tens of millions (Log10 7.0 = 10 million; Log10 8.0 = 100 million) per gram of sand (Kyle Field, Soccer Field) or soil (Intramural Field) and fungi number in the tens to hundreds of thousands per gram.

The soccer field was first sampled just 2 weeks after washed Bermudagrass sod had been laid on an 11-inch base of pure sand with no organic amendments (peat). The sand used in construction of the field contained only 100,000 (Log10 5.0) bacteria per gram. Thus, we found that microbial numbers increased rapidly (10- to 100-fold) as the grass "grew in" and new roots of the washed sod were the primary source of microbes and the carbon sources to sustain them. Fluctuations did occur during the seasons and they appeared to be most associated with the moisture status of the fields when we collected samples.