Sports Turf Manager

for safe, natural sports turf

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Field Day Coverage

See pages 11-13 for a photo gallery showcasing participants at STA's 20th Annual Field Day held September 13 at the Westoby Ice Surface/ Olympic Sports Park in Dundas. Pictured below is keynote speaker Pam Sherratt and Field Day Committee Member Dave Chapman.

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You Can't Grow Grass on Concrete

PAMELA J. SHERRATT, OHIO STATE UNIVERSITY, 2007 STA FIELD DAY KEYNOTE SPEAKER

Years ago, a turf company ran a newspaper article where they showed a picture of grass growing on concrete to prove that growing turf was easy if you followed their plan. Growing grass on concrete is possible. Growing grass on concrete and playing football on it is not. This article looks at some of the issues we face in sports turf and how to improve the concrete soil conditions that develop.

There are several criteria that turfgrasses must have in order to be suitable for athletic sports: 1) adapted to the region's weather (i.e. "cool-season" zone); 2) tolerant of low mowing height; 3) wear resistant and good recovery; 4) tolerant of stresses and be able to compete with weeds; 5) fine textured and uniform leaf, to provide the athlete and ball with a smooth, firm and consistent playing surface; and 6) have good "quality" – color and density.

This list of criteria eliminates most grasses and leaves just a few that can be used in the northern United States and Canada. The most commonly used are perennial ryegrass (*Lolium perenne*), Kentucky bluegrass (*Poa pratensis*) and tall fescue (*Festuca arundinacea*). Table 1 (see page 15) highlights the pros and cons of each of these grasses.

Very rarely are these three grasses seeded alone. They are usually mixed or blended together. A "mix" refers to a seed mix that contains more than one species of grass. For example, a Kentucky bluegrass:perennial ryegrass mix. A "blend" refers to a seed blend that contains more than one cultivar or variety of the same species. For example, a 3-way blend of perennial ryegrass. The purpose of mixing and blending is to increase diversity and maximize resistance to disease and insect attack.

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COVER STORY: YOU CAN'T GROW GRASS ON CONCRETE

PAMELA J. SHERRATT, OHIO STATE UNIVERSITY, 2007 STA FIELD DAY KEYNOTE SPEAKER

Sports Turf Grasses: The Bottom Line

When establishing a new field from sod or seed, the grass of choice is Kentucky bluegrass because it produces a high quality playing surface that can regenerate from underground stems, or rhizomes. Two key problems with using Kentucky bluegrass on sports fields are the slow establishment speed from seed and the high level of care it needs once it has established. These two issues make it very difficult for turf managers to maintain a Kentucky bluegrass field, which leads to over-seeding with perennial ryegrass and ultimately, a perennial ryegrass field.

Renovating a field, particularly during the playing season, needs to be done quickly to ensure grass cover and player safety. With speed being the deciding factor, perennial ryegrass is the grass of choice for most athletic field situations. Perennial ryegrass produces a quality playing surface and it has excellent quality. Unfortunately, it is susceptible to a whole host of turfgrass diseases and it does not persist well in very hot, dry summers. One of the other "issues" with perennial ryegrass is the fact that it does not spread by stolons or rhizomes and therefore needs over-seeding regularly. Many textbooks will not advocate using perennial ryegrass for that exact reason. I think that issue is mute for two reasons: (1) from the last several years of my research on compacted native soils, Kentucky bluegrass has not recuperated any better than perennial ryegrass, and (2) on heavily trafficked turf, ALL grasses need over-seeding.

The most common athletic field seed mix in Canada is Kentucky bluegrass and perennial ryegrass. In theory, this mix should produce a mixture of these two grasses on the field. In practice, the perennial ryegrass dominates. Research has shown that if the perennial ryegrass exceeds 15% of the seed mix by weight, it will be the predominant grass. To sum this up, most sports fields in the northern US and Canada are dominated by perennial ryegrass, not necessarily through choice but because the grass is quick and wear tolerant.

Trait	Kent. Bluegrass	Peren. Ryegrass	Tall Fescue
Wear Tolerance	M-G*	G	G
Recuperative Potential	G	M	F
Quality	G	G	M
Establishment Speed	F	E	M
Drought Resistance	F-M	G	G
Drought Tolerance	G	F-M	F-M
Insect Avoidance	F-M	M-G	G
Disease Avoidance	M	F	F-M
Shade Tolerance	F	F	G
Fall & Spring Color	F-M	G	M

Table 1. Pros and cons of cool season turfgrasses for recreational areas. *KEY: Excellent (E), Good (G), Medium (M), Fair (F).

Tall fescues are gaining popularity. Once established (usually after two seasons), they are very wear tolerant, drought tolerant and good in low-maintenance or shady situations. Their persistence during the winter months in Canada is something that may limit their use, as they are more prone to winter kill than Kentucky bluegrass or perennial ryegrass.

Field Longevity, Durability or Wear Tolerance

How long a field can last during a playing season depends upon many factors. The most important factors (in order) are: 1) soil infiltration rates; 2) turf management practices; and 3) selection of turfgrass cultivars

The majority of problems encountered on athletic fields are caused by poor soil conditions. Turfgrass plants will only grow in healthy soils that contain oxygen for drainage, gas exchange and root growth. The top 50-100 mm (2-4 inches) of soil can become so compacted that oxygen levels are reduced to near zero and water infiltration rates can be as low as 0.25 mm/hr (0.01 inches/hr). Using the 0.25 mm/hr infiltration rate as an example, if there was 25 mm (1 inch) rain during a game, the water would take 100 hours, or about a week, to drain into the soil, which is unacceptable and would probably lead to cancelled games.

Improving the water infiltration rate of a soil means improving the soils capability of draining. Native soil fields used for sports fields need to have a minimum water infiltration rate of 25 mm/hr. Improving the soil drainage is achieved by changing the soil texture (amounts of sand, silt and clay). Soils that contain less than 70% sand by weight do not drain very well. Options for improving the soil texture, and therefore the drainage rate include: 1) Amending the native soil with sand, either at the time of construction or by regular annual topdressing; 2) Installing a "by-pass" system, like sand slits (Figure 1, page 17), that by-pass the native soil and create channels from the field surface to underlying drains; and 3) Building a sand-based field (>85% sand).

The Sports Turf Research Institute (STRI) in England produced a suggested use rate for athletic fields based on their

drainage capabilities (Table 2). Dr. Dave Minner from Iowa State University has suggested similar limits for native soil fields, i.e. 50-80 events a year. This is by no means set in concrete, as fields can be destroyed in just a few hours if there is inclement weather during the game.

An extremely important turf practice that also improves water infiltration rates is coring or tining (see cover photo). These practices should be undertaken as often as manpower allows, ideally 6-8 times per growing season, or 1 time per month. Hollow coring produces small soil cores on the surface that need to be dragged in or collected so doing this during the playing season is not feasible, but solid tining during the season and hollow coring outside of the season is a good approach. Native soil fields also benefit from annual deep tining or verti-draining.

Turf management practices that increase field longevity include watering, mowing and applications of fertilizer.

Removing soil creates large air spaces in the top 4". For this operation to offer soil benefits, there must be at least 120-150 holes per sq. metre (12-15 holes per sq. foot).

Turf Irrigation

Watering sports fields is an art-form and requires turf managers to balance the amounts of water and oxygen in the soil. Over-watering leads to low oxygen levels and subsequent poor turf growth. With too little water, turf growth slows down, which is disastrous for sports fields where growth and recovery is needed. As stated earlier, the rate at which a field drains depends upon its soil texture, as noted by Ohio State soil physicist Dr. Ed McCoy (Table 3). As a rule of thumb, grasses need around 1-inch water a week to grow and this is usually applied over two increments to avoid run-off.

Mowing

Mowing practices dictate turf health. Turf that is mowed once every 10 days at 75-100 mm height (3-4 inches) with blunt mower blades will invariably look like a pasture. Turf that is mowed once or twice a week during spring and fall with sharp mower blades and at the correct height will not only look better but will have better density and texture and overall health (Figure 2).

Mowing height depends upon the sport in question (Table 4). Mowing at the higher end of the recommended range means a deeper root system and some improved drought tolerance. However, mowing at the lower end of the recommended range increases turf density and that's very important for "bunch-type" grasses like perennial ryegrass and tall fescue.

Fertilizing

Athletic fields need around 225 kg nitrogen per hectare per year (4-5 lbs N/

Figure 1. A "by-pass" system being installed. Sand slits create drainage channels from the field surface to underlying drains. The slits must be topdressed annually with sand or they can cap off/seal over.

Type of Field	Hours/Week Adult Use	Games/Year	Notes
Native soil with basic pipe drain	1-2	50-80	Heavy clay soils at the lower end of the range
Sand slits/slit drained	6	95-125	Sand TD program must be in place
Sand-based field	8-9	400+	Very high maintenance

Table 2. Effect of field type on hours of adult use (STRI Bulletin, January 2004).

Field Type	Waterlogged (days)	Drought (days)
Native Soil, pipes at 20 ft	4	10+
4" sandy-loam cap, pipes at 20 ft.	2	7
4" sandy-loam cap, pipes at 10 ft.	1	6
10" sand-loam cap, pipes at 20 ft.	0	7

Table 3. The effect of field type on soil water conditions after 25 mm (1 inch) of rain.

Figure 2. What a difference a mower makes! Same field, same problems (weeds, undulations) just mowed more frequently with better equipment.

1,000 sq.ft.). The majority of that nitrogen should be applied in late summer and fall. Generally, a balanced fertilizer of nitrogen (N), phosphorus (P) and potassium (K) is applied, with at least 50% of the content slow-release. Phosphorus and potassium applications are usually only made if they are deficient in the soil, so a soil test is recommended – every year on sandy soils and every 3-5 years on native soil. The uptake of nutrients into the turf plant is reliant on a growing root system, so healthy soil conditions are paramount.

Some Renovation Tips

Fields under heavy traffic are constantly evolving. They are not perennial crops, but are in a constant state of renovation. As such, sports turf managers look for ways to produce ground cover in a very short period of time.

One way is to lay sod. Using sod offers the opportunity to have a 100% Kentucky bluegrass playing surface. It also requires only 2-3 months of grow-in before play. During the grow-in period, sod needs watering and feeding. Fertilizer that contains a sizeable amount of phosphorus in the analysis encourages root growth.

Most, if not all sod, is grown on native soils, which is okay if the sod is being used on a native soil, but can cause some issues if it is being used on sand. Capping off a sandy field with a native soil sod significantly reduces the water infiltration rate. The sod layer must be diluted by coring and sand topdressing to improve its drainage capabilities and this practice can take several years to see a marked improvement in infiltration rates. Unfortunately, buying sod grown on sand usually involves buying sod from a grower many miles away, which means high transport costs. Many pro stadiums in the northern and midwestern US are sodded with sand-based sod from New Jersey!

The other way to establish grasses quickly under high traffic is with perennial ryegrass. Because time is of the essence, higher seeding rates are recommended during the playing season (Table 5). Outside of the playing season, rates are lower to encourage healthier plants that reach maturity and have better wear tolerance. High seeding rates mean that the plants remain juvenile and not as wear tolerant, but if green cover is needed, particularly if the field is constantly under heavy use, then these high rates are needed. I have found that 50 gms/M^2 per week on bare soil areas, applied with a drop seeder prior to games, has produced the best results. Slit-seeders cause too much surface damage on heavily traf-

Sports Field Use	Grass Species	Mowing Height
Baseball infields, field hockey & high quality soccer fields	Kentucky bluegrass &/or perennial ryegrass	1.0-2.5 in.
Baseball outfields, soccer, football, lacrosse, polo & rugby fields	Kentucky bluegrass &/or perennial ryegrass	1.5-2.5 in.
Intramural & multiple-use fields	Kent. bluegrass &/or per. ryegrass, or tall fescue	2.0-3.0 in.

Table 4. Optimum range of mowing heights for sports fields.

Situation	Seeding Rate (lb/M)	Seeding Rate (gm/M2)
New field or major renovation (close season)	5-8	25-40
Overseeding during the playing season	10 per week	50 per week

Table 5. Perennial ryegrass seeding rates.

ficked areas like goal mouths.

Higher seeding rates are also used to out-compete weeds. Establishing turf on bare soil can be difficult as broadleaf and weedy grasses fill in bare areas quickly. Crabgrass and *Poa annua* are two of the main culprits and they will infest areas quickly if there is bare soil for any length of time. Fast establishing turf like perennial ryegrass is much better at competing with these weeds than slower species like Kentucky bluegrass.

Recent additions to the overseeding market for sports turf managers are a turf-type annual ryegrass and several cultivars of transitional ryegrasses. Both of these are quick to establish and produce green cover during the playing season. The annual dies the following spring/early summer. The transitional ryes last longer.

The critical factor in seeding success or failure is seed moisture. The bottom line is this – seed will not germinate if it is not kept in a constant state of moisture. In real-life terms, that means someone has to commit to lightly wetting down or "syringing" the seed several times a day for as long as it takes for the seed to germinate. For perennial ryegrass that means 5-7 days, for Kentucky bluegrass that means 14-21 days. A typical syringing program might be to lightly wet the seed with a hose at 9 am, noon, 2 pm and 4 pm. Using pop-up sprinklers to syringe the seed typically results in too much water being applied and saturated soils, so hosepipes work best.

Another key to successful seeding is the application of a starter fertilizer (with phosphorus). Fertilizer has a tremendous effect on establishing new grasses.

In conclusion, the single most important factor that affects turf growth and recovery and the performance and safety of a sports field is the immediate, underlying soil. Turf managers must be proficient at managing the soil so that it has the right balance of water and oxygen. When the soil is in poor condition, all other factors are affected. No amount of seed and fertilizer will help if soil conditions are not conducive to turf growth.

Under heavy traffic conditions, higher rates of perennial ryegrass are needed to ensure field safety and performance. Coupled with fertilizer applications and regular mowing, these turf practices can make a huge difference to the quality of a field. Last but not least, choosing the right grass for the situation is important. If there is a strong desire to have a Kentucky bluegrass field, sod offers that option. In most other cases, mixes of Kentucky bluegrass with perennial ryegrass are used, with an understanding that over time the field will be dominated by perennial ryegrass, particularly once over-seeding starts during the playing season. ♦

Pamela Sherratt is the Sports Turf Extension Specialist at The Ohio State University and was the feature speaker at the STA's 20th Annual Field Day. Pam disseminates sports turf research to the industry in a variety of ways, including the development and implementation of the Buckeye Sports Turf Program to keep sports field managers abreast of current topics important in the management of athletic fields (http://buckeyeturf.osu.edu/).