Balancing soils for sports turf

BY **JOEL SIMMONS**

The sports turf manager has perhaps the most difficult agronomic conditions to manage in all of agriculture. Overused fields, limited budgets and poor soil conditions make for situations that only a magician could properly maintain. One of the best tricks in the sports turf magician's bag is a quality soil testing protocol. A good soil testing program can help to produce a turf that is more deeply rooted with less stress and disease issues, and a soil that is open and more capable of proper drainage, leading to fewer turf related problems and fewer liability issues.

A good soil testing protocol can help produce a healthy soil. A healthy soil is a living, breathing entity that consists of a chemical, a physical and a biological profile. All three disciplines need to work in harmony in order to create a sustainable environment for a quality turf. As the soil opens physically more air and water moves through the soil creating a better environment for the proliferation of beneficial soil microorganisms.

Soil chemistry affects the physical structure of the soil as was seen by the work of Bob Studholme at the Fairfax County Park System (all photos courtesy of Fairfax County Park System).

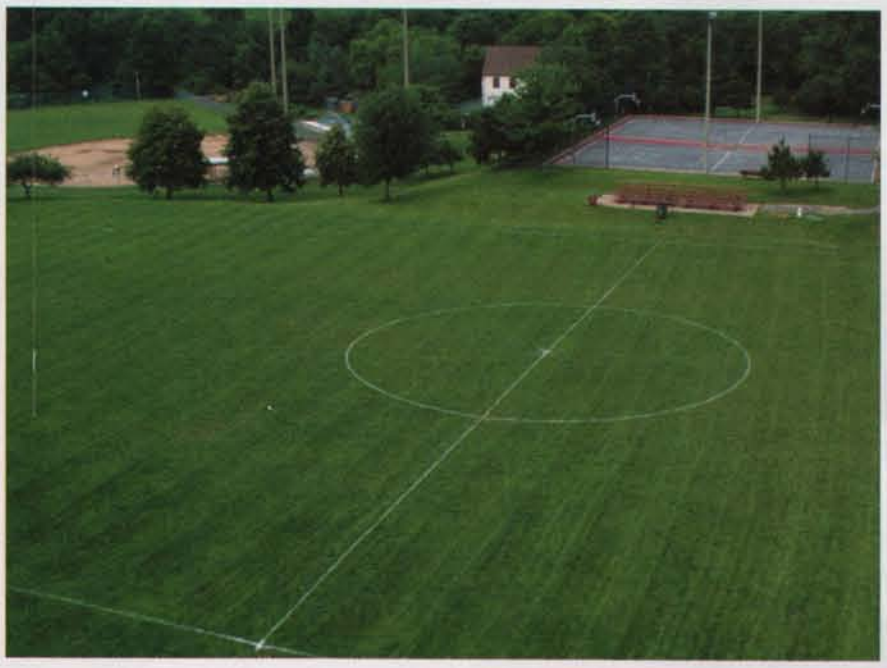
Following an approach of "balancing the chemistry and feeding the soil" allows the sports turf manager to create an agronomic environment that is sustainable, one that reduces inputs and lessens common problems. Balancing the soil starts with a quality soil test, one that looks beyond pH and NPK fertility alone. Feeding the soil addresses need to balance the important carbon to nitrogen ratio in the soil. Recent research studies at Penn State have shown significant improvement in field quality when composts were used as topdressing.

"We began an aggressive soil testing program on all of the Fairfax County Park Authority athletic fields back in 2000, and within a few seasons we were seeing some amazing results. We have 275 fields, which is quite an inventory, and it took 2 years to sample all the fields and act on the soil reports. Our soils were consistently low, sometimes very low, in calcium and potassium and high in magnesium with relatively high CEC's. Combined with aggressive aeration and a more natural-organic approach to nutrition, turf quality has really improved," says Bob Studholme of the Fairfax County (VA) Park Authority.

The soil testing protocol that was established for Fairfax County was set up using standard and water-soluble "paste extract" soil tests performed by Logan Labs of Russell's Point, OH. Chemical imbalances were identified on most sites throughout the park systems' fields. Many of the imbalances were extreme. Most sites had very tight soils and water drainage was a serious concern. Roots were shallow, clipping volume was weak and wear recovery was poor even on the irrigated sites.

All 275 fields were tested over a 2-year period and a program was established for each site. The issue of most concern on the majority of sites was a very high level of magnesium in the soil and weak levels of calcium and potassium. For the most part, the most frequently recommended inputs were high calcium limestone and gypsum. Some sites showed calcium levels as low as 35% base saturation with magnesium levels above the 25% mark. Ideal calcium percentages should be in the 60-70% range with magnesium levels between 12-17%. This combination of low calcium and high magnesium consistently produced tight, compacted soils and weak turf. As the high calcium lime was applied, calcium percentages started to improve and magnesium percentages fell on the soil test results. On all fields as this balance began to take place the soils became less compacted, rooting was deeper, recovery was better and rates of fertilizer fell.

According to Studholme, "This program saved the County untold sums of



money. The results that we experienced are striking. The soils opened up physically in only a few years of work and we've been able to reduce the amount of inputs to maintain quality turf, despite the sometimes frustrating endeavor of managing in the Transition Zone. We still have some pest problems of course, but the severity has lessened and recovery is much improved. Before taking this approach, the turf would show signs of stress at the first hint of unfavorable environmental conditions. We were constantly battling Dollar Spot and Brown Patch through the summer, and thin stands of turf were prone to weeds. Now it's a whole new ballgame: the turf is much more resistant to climatic changes, recovery has improved, the soils drain better, and the denser stand of turf out competes most of the weeds. And all of this while reducing fertilizer input," says Studholme.

According to Jim Heck, Lead Agronomist at Soil First Consulting who has developed recommendations from the Logan Labs reports for the Fairfax County Parks system, "We look at the whole soil report to help us identify imbalances on the soil colloid. Ideally we would like to see a base saturation of 68% calcium, 12% magnesium, 5% potassium, 2% sodium, 3% trace nutrients, and 10% hydrogen for soil based fields. On soil based fields base saturation percentages are a good tool to help us identify the physical and biological profile of a soil.

"These percentages are not as good a tool on low CEC sand based fields where we rely as much on the sufficiency levels as we do the relationships between the nutrients," says Heck. "The real key is that we look at the big picture and don't get stuck on soil pH alone, or single nutrient analysis as most conventional instruction teaches. Many times with the Fairfax County soil tests we made changes to a site using what the soil test told us to do, which went against what the pH was suggesting. We ask the question 'why is the pH what it is.' This allows us to build recommendations that are based on the whole soil profile.

"In the case of Fairfax County there were many fields where we applied high calcium lime to the soil to lower high magnesium levels and reduce calcium deficiencies," Heck says. These applications affected the soils in very positive ways but may not have been suggested if we were focused only on soil pH."

Think of the pressure that a typical sports field in most school or park settings is placed under each year. Some fields handle as many as 20,000 set of feet in one season. That can be equivalent to one ton or more of direct vertical pressure per square foot of soil surface. In areas of the crease or down the center of the field that pressure can be even worse.

"Our fields are used heavily; they basically have a 30-34 week season. There is an event of some sort on them pretty much every day during this time, unless closed for weather related issues. We have over 1.1 million residents in Fairfax County and the demand for athletic field space is tremendous. Once we started using soil reports and balancing the soil chemistry, the fields started to show improved water drainage and rooting within a couple of years. There is no question that this approach has led to much more sustainable turf while reducing the need

for rescue remedies. I believe that balancing soil chemistry and enhancing soil biology is the cornerstone to any turf program. The proof is in the pudding," says Studholme.

Soil testing for sports turf is not a new practice but too often it is taken for granted. Developing a complete soil testing protocol with a quality soil-testing laboratory can pay significant dividends. Looking at what the soil test is telling you is the key to building the best nutrient management programs. "We went beyond conventional wisdom and we made the changes that we were seeking for years," says Studholme. These changes start by balancing the soil chemistry. **ST**

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