

Soil oxygen: the forgotten nutrient

by Michael Flowers, President

We all know that fertilizer applications are necessary to achieve healthy, vigorous turf. Typically, these fertilizers contain nitrogen, phosphorous and potassium. Sometimes secondary nutrients, or "micronutrients," are also applied.

What is often forgotten, however, is that CARBON, HYDROGEN and OXYGEN comprise the three most important elements for plant growth. Grass blades take up carbon and oxygen in the form of carbon dioxide (CO₂) to use in photosynthesis; the plants also take up hydrogen and oxygen in the form of water (H₂O). What is rarely understood is that the plant roots also need oxygen (O₂) to function. Roots take up oxygen and give off carbon dioxide, just as animals do in breathing. Where does this oxygen come from? From the soil air, which ultimately exchanges with the air above ground. A soil must "breathe" and refresh its oxygen supply or plant roots will not flourish.

The figure on the far left below (NORMAL) shows the percentage of air and water needed in the soil to support good plant growth. Solids (soil minerals and organic matter) occupy about 50% of the soil volume. The remaining volume is made up of gaps and crevices called soil pore spaces. Ideally, half of these pore spaces are filled with air and the other half with water.

Oxygen Blockers

The center and right figures show the soil composition typical of many athletic fields. COMPACTED soils, which are very common in sports fields, are

the result of repeated foot traffic. Light play will compact soils over a season or two; intense foot traffic can compact soils in just a few months. The potential for compaction increases as soil moisture increases.

POORLY DRAINED soils result from a number of causes. Uneven grade – worn areas or low spots where the field crown has deteriorated – will often cause water to collect, hampering drainage. Excessive rainfall or irrigation is another common contributor to poorly drained soils. Because compacted soils are often poorly drained, one problem tends to lead to the other.

Compaction and poor drainage both cause LOW SOIL AIR. When the air in the soil is inadequate, grass plants will develop a shallow root system, and quality turf cannot be maintained. When soil becomes highly compacted, as in a typical sports field, turf may not grow at all from lack of oxygen in the root zone.

What Can Be Done?

In highly compacted soils, frequent deep aeration is the best solution, short of completely tilling the soil. Championship Turf Services uses several different aeration technologies, depending on the needs of the field. In some situations, adding modifications to the soil prior to turf establishment, or as top-dressing following aeration, will help reduce the potential for compaction and make aeration more effective.

Improving soil drainage can be difficult. Sub-surface drainage systems are often ineffective (and costly), espe-

cially in poorly draining soils. Some fields call for soil enhancements to help improve drainage. Surface drainage solutions, on the other hand, are often as easy as re-establishing the correct crown and filling in low spots. Championship Turf Services provides precision laser leveling to achieve a free-flowing surface to any gradient.

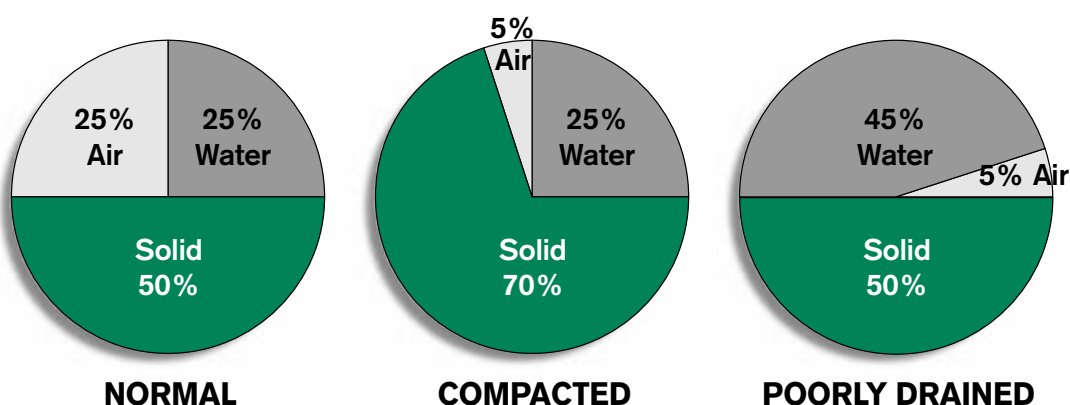
Remember that deep, vigorous root systems are the key to healthy turf. By aerating your fields regularly, carefully monitoring your irrigation practices, and making periodic surface drainage improvements, you will improve oxygen flow to the root zone – and the appearance and long-term viability of your turf. Something else will be enhanced: the safety and performance of your athletes.

Compaction and poor drainage are an athletic field's biggest enemies. Find out why a growing number of facility managers, landscape architects and general contractors consider Championship Turf Services their sports fields' greatest friend.

Types of aerification

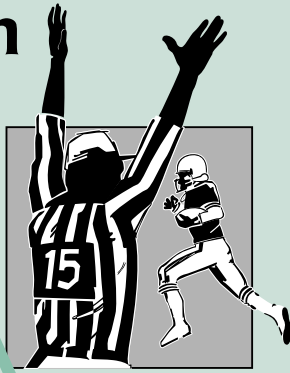
- **Deep-tine** (8"-10" depth) – Cultivation method that increases deep rooting and deep voids which immediately increase initial water infiltration. Relieves deep-seated compaction that conventional aerators can't reach.
- **Conventional coring** – Relieves compaction in top 3-4 inches. Also is a means of thatch control. Allows for removal of existing soil and soil exchange.
- **Aeravating** – Vibrating solid tines fracture the top 4 inches of soil. Very effective on hard ground that other equipment won't penetrate.
- **Slicing** – Creates channels that allow water and air to reach root system. Promotes tillering of grass plants. Accelerates drying of wet soils. Minimal disruption of soil, excellent choice for in-season aerification.

Soil Makeup: Why Your Turf May Be Struggling for a Breath of Fresh Air



9 tips to beat compaction

- 1 Establish a field use policy that addresses when to shut down or rotate fields.
- 2 Postpone play or use alternate sites for band use and practice sessions.
- 3 Avoid irrigation two days before heavy use. Keep use to minimum when field is wet.
- 4 Move non-stationary goals so play is not concentrated in the same area week after week. Place practice goals off field if space allows.
- 5 Dedicate one field for team or tournament play if possible.
- 6 Stay off of partially thawed areas.
- 7 Do not play on new turf until it is fully established.
- 8 Aerate often, at least four times a year.
- 9 Incorporate granular rubber or calcined clay into the soil or as a topdressing agent to reduce compaction.



A Few of Our Outstanding Fields...

– A partial list of Connecticut sports fields recently constructed or renovated by Championship Turf Services... Individual project profiles available on request.

- **UConn Memorial Stadium, Storrs** – Football field reconstruction.
- **Joseph Morrone Stadium, Storrs** – Renovation of field for UConn Men's and Women's Big East Conference soccer and lacrosse teams.
- **Taft School, Watertown** – Varsity soccer field construction.
- **Loomis Chaffee, Windsor** – Renovation and maintenance of fields.
- **Westminster School, Simsbury** – Soccer field construction.
- **Bristol Central High School** – Athletic field construction and year-round maintenance.
- **Newtown High School** – Football field reconstruction.
- **Fuessenich Park, Torrington** – Baseball field renovation.
- **Vito "Billy" Colangelo Memorial Sports Complex, Torrington** – Construction of six-acre midget football facility and seven-acre little league baseball facility.

Overseeding Maximizes Value of Aerification

Because the soil brought to the surface by coring provides an ideal seedbed, it is good practice to overseed your fields following aerification. If the field is uneven or bumpy, consider topdressing before seeding to repair the grade. A well-planned overseeding program will...

- improve turf density
- introduce new/improved seed varieties
- help repair wear areas
- redress insect, disease and drought damage
- provide a uniform and safe playing surface

OVERSEEDING BASICS: It is best to use a blend of aggressive bluegrass varieties (Alpine, Limousine and Touchdown) at a rate of 2 pounds per 1,000 square feet. In thinner areas (less than 75% coverage) use a mixture of 2 pounds Kentucky Bluegrass and 5 pounds perennial ryegrass. Completely bare areas should receive an additional 5 pounds of perennial ryegrass. Apply a starter fertilizer after seeding. Provide light watering until all seed varieties have emerged. It's best to keep the field mowed at 1 to 2 inches until the seedlings are established.



About Championship Turf Services...

Athletic fields must be built to exacting standards which satisfy both the immediate needs of athletes and the long-term viability of your facilities. You need a contractor who shares your attention to detail and obsession for quality. That's **Championship Turf Services**. We are a unique blend of agronomist and contractor, offering a full spectrum of athletic field construction and management services, including:

Precision Laser Leveling
Seed/Sodbed Preparation and Planting
Custom Aerification • Overseeding
Topdressing • Drainage Solutions
Speed Seed™

Call us today to discuss *your* athletic field project.

Toll-Free: (800) 562-5860

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