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Product Showcase

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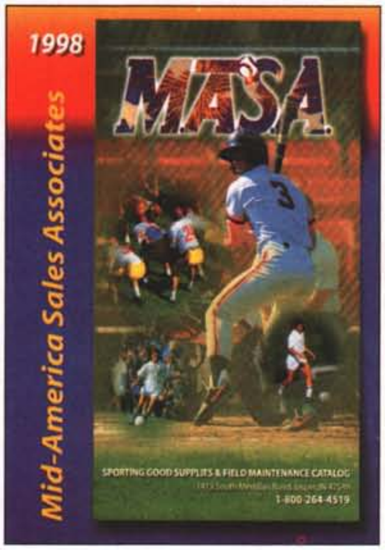

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Continued from pg. 20

Even kids can get into the act in community projects, but make sure they're supervised properly and that insurance coverage extends to volunteers working on the job.
Courtesy: Jim Puhalla

Warnings for contractors

If you're a contractor rather than a staff member at a school or park, here are a few suggestions from someone who's been put through the wringer on several occasions when volunteering to help a community group.

First of all, volunteer your services in writing. Treat it like any other job. Create an estimate or work order that shows what you'll do and what, if anything, it will cost. Add a line that says "additional work will be quoted separately." That way, if people start thinking up other things they'd like to have done, you have a little protection.

Second, count on complications. Facilities owned by community organizations are notorious for problems that should have been fixed back in the Korean War days. You're also likely to encounter projects that were done by inexperienced volunteers who think you can solve any problem by spreading dirt on it. Add 25 percent to the amount of time you budget.

Third, never count on volunteer labor. "We'll have a few of the boys come and help. You can just supervise!" Yeah, right. Most volunteers get there late, eat donuts, get in the way for a while, then leave to help the Mrs. get groceries. If you need help to do the project, take your own. Otherwise, you could be there for days.

Fourth, be careful what you "guarantee." If you won't be working on the field on a continuing basis, put in writing what the organization will need to do to keep the facility in decent condition. Otherwise, if bad maintenance causes the field to start holding water in five years, the next generation of volunteers may demand that you rebuild it for free, and then bad-mouth you all over town if you refuse. Carefully establish just how much of a warranty you intend to offer.

As with any job, the secret to creating a happy community-group customer is good communications. Don't assume that volunteers understand your business or the demands on your time. Put things in writing, and talk through the project to avoid misunderstandings.

Consider your relations with community groups to be part of your facility management job. If you keep them in touch with your work, you can get them more involved in helping to raise money and otherwise support your program.

It also helps to be a fanatic about the quality of your fields–and to try to make your people fanatics, too. If you have at least one high-quality showplace field, it will be easier to get support from community groups to raise money for future projects on all of your fields.

In today's environment of declining public budgets for facilities like sports fields, keeping groups like boosters and sports associations involved in your work can make the difference between having first-rate fields and making do with less. It's definitely a management task, but one with such high potential rewards that it's well worth learning. ❑

Jim Puhalla is president of Sportscape International, Inc., of Boardman, OH, and Dallas, TX. He is author, with Mississippi State University Professors Jeff Krans and Mike Goatley, of a forthcoming book: "Sports Fields–a Manual for Design, Construction and Maintenance." *Copyright 1998, Ann Arbor Press, Inc., Chelsea, MI.*

Soil Gas

by Dave Potts, Mike Schaefer, and Will Schnell

Turfgrass managers have long realized the benefits of root zone aeration. Considerable resources have been directed toward maximizing air/soil gas exchange levels to promote overall plant health and stamina. Recent technological advancements now permit these aeration levels to be accurately quantified.

What is air?

Air is: nitrogen (78.08%), oxygen (20.95%), argon (0.93%), carbon dioxide (0.03%), neon (0.0018%), helium (0.0005%), krypton (0.0001%), and xenon (0.00001%). Air also contains water vapor, hydrocarbons, hydrogen peroxide, sulfur compounds, and dust particles.

What is soil?

Like air, soil is comprised of components: minerals, organic matter (both living and dead), water, and gasses. The percentage of each varies with soil texture and structure. In a typical sand-based root zone, the ratio between space occupied by solids and pore space is close to 1:1. This pore space consists of both soil gasses and water as illustrated in Figure 1.

Why are soil gas concentrations different than those in air?

To a large degree, soil gasses are produced through plant and microbial metabolic processes. Aerobic metabolism is fueled by the presence of organic matter, oxygen, and moisture. Byproducts include water and carbon dioxide. This process accelerates as temperature increases.

In the soil, gasses exchange at a relatively slow rate, principally by diffusion or displacement of fluids (liquid and gaseous). Carbon dioxide builds up in the root zone and resides there until it is influenced by one of these mechanisms.

As oxygen is consumed through the metabolic processes, carbon dioxide is produced. The concentration of carbon dioxide increases and the concentration of oxygen decreases proportionately.

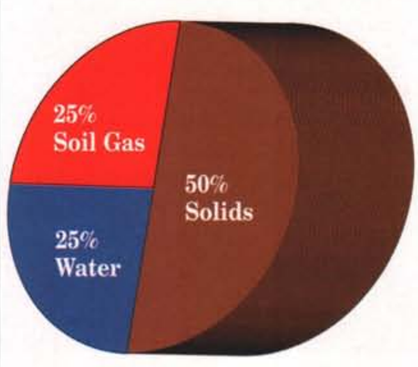
This ultimately limits the activity of aerobic organisms within the root zone. If oxygen continues to be depleted, anaerobic metabolic processes will begin to dominate. This results in the production of methane, hydrogen sulfide, and other toxic gasses.

What factors govern soil gas formation?

Many variables influence the composition of soil gas. These include, but are not limited to the following:

• *Temperature:* In general, oxygen demand increases with temperature. Most microorganisms living in soil are mesophilic; they grow best at 25°C. However, mesophiles will continue to grow at temperatures as low as 15°C, and as high as 35°C.

Figure 1. Typical solid:fluid ratio in a sand-based root zone.



Cool-season grasses have an optimum temperature range of 27-35°C. When soil temperatures approach the high and low extremes of the 15-35°C range of mesophile growth, a decrease or cessation of biological activity results. Additionally, temperature gradients that develop between soil and atmosphere create thermal diffusion.

• *Soil Moisture Content:* Moist soils have a lower gas diffusion rate than drier soils. When soils are saturated, oxygen diffusion is limited to the solubility at a given temperature.

For instance, at 15°C the solubility of oxygen in water is 0.001%. By comparison, the concentration of oxygen in air is 20.95%.

Soil moisture is also a good thermal conductor and can greatly affect soil temperature. Conversely, dry soils contain a higher percentage of gasses, which are more efficient insulators.

• *Organic Matter:* Organic matter provides an energy source for soil microbes and plants. Microbial action is instrumental in the decomposition and mineralization of organic matter into phosphorous and nitrogen, which makes it available for plant uptake. When this metabolic process occurs, oxygen is consumed and carbon dioxide is produced.

• *Soil Permeability:* Low-permeability soils have correspondingly low gas diffusion rates; high-permeability soils have high gas diffusion rates. When diffusion is limited, oxygen is consumed more rapidly than it is replaced. Consequently, carbon dioxide concentrations increase.

• *Wind:* When winds of relatively high velocities are directed into soil, a differential pressure gradient develops. This pressure gradient results in the exchange of soil gas with air.