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Aeration and Topdressing Strategies

By Jim Puhalla

Two of the most useful turf-care practices in the field manager's toolbox are aeration and topdressing. But the increasing variety of equipment and materials requires more decisions than ever before. On one hand, you have more options for providing exactly the treatment your turf needs. On the other hand, making incorrect choices can reduce the effectiveness of your work.

Aerification

The primary goal of aerating is to relieve compaction, which is the compression of the topsoil due to foot or vehicular traffic. Compaction can be a particular problem on sports turf, because of the amount of foot traffic that results from its use as a playing surface.

When the soil becomes compacted, turf root systems can't get the oxygen they need, and the soil becomes a barrier to root penetration. So the soil must be aerated occasionally to restore its viability as a growing medium for turf plants.

Here are some of the considerations to be made in planning for aeration:

1. Timing. When timing aeration, be sure that the grass is actively growing so that it will recuperate quickly. Despite its long-term benefits, aeration temporarily stresses the turf. In most soils, full recovery takes about 15 days.

For *warm-season* fields, the best time to aerate is late spring through late summer. Aerating after that time is risky, because the turf may not have time to recover before cold weather brings the risk of winter cold injury.

For *cool-season* fields, the grass is most active in May and September, so those are the best months for aerating. An alternative practice available to managers of cool-season fields can actually turn the cold weather into a tool for combatting compaction. Aerate right before winter and leave the holes exposed. The freezing and thawing of water in the holes will fracture the soil even deeper and wider than usual, and will provide improved relief from compaction. (Cool-season turfgrasses tolerate cold much better than southern varieties.)

Time your core aeration around your most important sporting events, because the holes can catch players' spikes, and the dried cores can disrupt the roll of a ball.

Aerate heavily compacted areas (like the center and bench areas of football fields and the goal areas of soccer fields) more often than the rest of the field.

You can coordinate nutrient applications with aeration to help get the materials directly into the soil.

In the past, there were questions about the wisdom of performing core aerification following pre-emergence herbicide applications, and particularly about whether or not the herbicide barrier is broken by aerification. Recent information indicates that the herbicide activity is probably not greatly altered, especially if the cores are returned.

2. Type of Equipment. Hollow-tine *core aeration* is regarded by many turf managers as one of the most useful practices in maintaining a quality field. Heavily used sports fields that do not get regular core aeration usually have very little turf. Core aeration provides the longest-term improvements in air and water infiltration, percolation rates and healthier root systems.

However, there are two side-effects of core aeration which must be remembered: surface disruption and core litter. Surface disruption stresses the turf, but aggressive fertilization and irrigation shorten recovery times. Core return by mat dragging or vertical mowing improves field playability, and also represents a form of topdressing with soil native to the field.

Tine diameters on most hollow-core machines range from 1/4 to 3/4 inch, and depths are typically 3 to 6 inches. Deep-tine units can remove up to 1-inch diameter cores to depths of 12 inches. For most sports field aeration, standard units do the job effectively, but more compacted or poorly percolating fields may need larger, longer tines.

Solid-tine aeration creates a hole, but does not remove a core. Solid tines are usually selected because of the limited surface disruption they cause, but they also provide other benefits. Solid-tine aeration is also commonly called "shatter core" aeration, because the solid tines cause a "quaking" action that can fracture subsurface compaction zones — especially with a deep-tine (up to 12-inch) aerator. This piece of equipment can be especially helpful in aerating the deeply compacted sections of a football or soccer field. Deep-tine aeration can also improve drainage on fields that were excessively compacted by rolling when they were constructed.

Core aerating can be performed with tractor-driven equipment, or with hand equipment such as this tool. Hand equipment is ideal for aerating highly compacted areas such as the middle and bench areas of a football field, or the goal areas of a soccer field. Photos courtesy: Jim Puhalla.

Solid-tine aeration alone is not a complete aerification program. In fact, repeated use of solid tines can actually

create a compaction zone in the soil, particularly if the same diameter and depth tines are used. A better practice is to incorporate solid-tine aeration into your overall program when you need some short-term improvement in water infiltration and percolation with minimal surface disruption (during the season, for instance).

Solid-tine aeration is just another tool in the overall management program; it alone cannot replace hollow-tine aeration.

Spiking and slicing equipment penetrates the soil with solid metal blades to allow water and air to reach the root system. Spiking and slicing can also sever the lateral stems of bermudagrass, bluegrass and bentgrass to encourage lateral root growth and thicken the turf. Slicers and spikers can also accelerate drying of persistently wet soils. The benefits of spiking or slicing are short term, but surface disruption is minimal, so the procedure can be done frequently during the season with little concern about surface playability.

(Slicing equipment is also a good tool for seeding into existing turf. Slicers create grooves in the soil, giving the seed a place to germinate. This process is commonly called "slit-seeding.")

Solid-tine aerating equipment frequently includes a quaking action to enhance the relief of compaction. This action is sometimes referred to as "shatter-core" aeration.

Deep-tine aeration with solid-tine equipment can relieve sub-surface compaction. In this case, the tines reach 12 inches into the soil.

Topdressing

Topdressing is adding native or amended soil to the surface of the turf. Done correctly, this technique can level uneven surfaces, enhance the soil for better drainage and rooting, control thatch, and assist in seeding operations.

When topdressing, apply frequent, thin layers (typically 1/16 to 3/8 inch). Uneven layers can lead to harmful compaction, and can retard the flow of

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Broadcast spreaders are an ideal method for topdressing. Mat drag after spreading to evenly distribute the material.

water and nutrients into the soil. Mow the grass to a relatively short height before topdressing, to allow the material to get right to the surface of the soil.

The equipment used for topdressing ranges from broadcast spreaders to drop spreaders or even front-loaders, all driven by a tractor with turf tires.

When applying topdressing material, it's a good time to level the field. A tractor with a level bar attachment (up to nine feet wide) can level uneven surfaces to improve footing and ball response, and can also improve surface drainage. (Topdressing for surface leveling can be done in combination with or without core aeration.)

1. Topdressing Material. The material used for topdressing should be the same as that of the existing field. It's important to correctly plan for the amount of material needed. Topdressing a field to a depth of 3/8 inch takes 1.5 cubic yards for every 1,000 square feet.

Topdressing can also be used to amend field soil. To amend heavy soils (soils having a large percentage of silt and clay) use a uniform sand with most of the particle sizes in the coarse range (between 0.5 and 1.0 mm). Fine to medium sands (between 0.1 and 0.5 mm) are better for "soil-less" rootzone mixes than for topdressing soil fields.

To enhance the quality of an existing heavy soil field, start with an aggressive core aeration. After core aerating, leave the cores so they will be mixed into the sand during the topdressing and dragging operation. (The coarse sand needs some fine soil to make it more compatible with the existing soil.)

Some sports field operations use topdressing material that includes a conditioner like calcined diatomaceous earth or calcined clay, in combination with coarse sand, to increase water retention.

2. Thatch Control. Thatch control is improved by core cultivation, dragging the cores across the surface, and topdressing. When soil becomes intermingled with the thatch layer, microbes in the soil begin to break down the thatch, and provide a better rootzone mix.

Thatch is like a sponge that draws the moisture out of the underlying soil. It also dries out quickly in hot and dry weather conditions. The presence of soil in the thatch layer will improve water retention.

3. Seeding Operations. Often topdressing is performed in combination with an aggressive program of overseeding (in the South) or reseeding (in the North), since the topdressing material provides a good germinating medium. A combination of core aerification, topdressing, and slicing provides good seed/soil contact, and dragging and rolling after seeding will increase the rate of germination.

Typical seeding rates are 10-20 pounds of perennial ryegrass seed per 1,000 square feet in the South, or 8-10 pounds in the North. To improve the quality of a clumpy ryegrass field in the North, use 2-3 pounds of bluegrass seed to each 1,000 square feet of turf.

In conclusion, it's a good idea to use various types of aeration equipment during different times of the year, and to use topdressing in combination with aeration to level the surface, modify the soil and control thatch. If your budget allows, having a variety of equipment will help you solve many problems and produce a healthier field. ❑

Jim Puhalla is president of Sportscape International of Boardman, Ohio, and Dallas. He is co-author with Mississippi State University professors Dr. Jeff Krans and Dr. Michael Goatley (who also supplied information for this article) of a forthcoming book, Sports Fields: A Manual for Design, Construction and Maintenance, *to be published by Ann Arbor Press Inc., Chelsea, Michigan.*

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