

# Sand Capping Solves Everything . . . Or Does It?

Plating tees and fairways with sand has been promoted as reducing maintenance costs while improving turf performance and playability, but it has unique management needs of its own.

BY BUD WHITE

**S**and capping, or plating, golf course tees, fairways, and even roughs with several inches of sand or a high-sand mix for improved turf health and drainage first began about 20 years ago. It gained merit from the positive results obtained, particularly in the Pacific Northwest, from heavy fairway sand topdressing programs designed to improve turfgrass growing conditions, drainage and, most important, playing quality. With heavy sand topdressing programs, golf facilities were able to build up a three- to four-inch layer of sand within a few years. Doing so provided excellent results as turf health improved, traffic tolerance increased, and fairways became more accessible to play and maintenance following inclement weather. This prompted many architects to include sand capping in construction specifications for high-end golf facilities, and the trend began to expand more rapidly in the late 1990s and early 2000s. Currently, sand capping is emerging in many other parts of the world, especially on sites with poor-quality soils. Are the results too good to be true? Does sand capping golf course playing areas solve all turfgrass management problems as some seem to believe?

Sand capping at first appears to be the answer to achieve easier turf management and ideal playing conditions. Many believe if money is spent to plate the entire golf course with anywhere from 4 to 15 inches of sand prior to final shaping and planting, then virtually every turf management problem and practice, such as aeration, will be all but eliminated. This is not the case for a number of reasons, and we will



*Figure 1: Capping tees and fairways with sand can greatly improve the growing environment for turf, especially on sites with poor-quality soils or irrigation water.*

explore not only the tremendous advantages of sand capping tees, fairways, and roughs, but also the disadvantages and where mistakes have been and are still being made with this process.

## TESTING, TESTING . . .

The first step is to utilize the services of an accredited physical soil testing laboratory so sand specifications for sand capping can be closely evaluated, much like what would be done for putting green construction. Sands that perform well in a sand-capped environment can be quite different in their physical characteristics compared to sands for the USGA method of putting green construction. Additionally, golf

facilities typically strive to obtain the least expensive sand possible when selecting a sand capping material because of the sheer volume to be purchased. Therefore, utilizing an accredited physical soil testing laboratory will help to identify suitable sands that are the least expensive.

One big difference in evaluating the performance of sand used for capping native soils versus the sand used for putting green construction is the application of moisture release curve data. While the USGA guidelines for putting green construction include a specific range of particle size distribution and a specific 12-inch depth of the rootzone, no such specifications exist for the



Figure 2: Growing turf on sand-based rootzones, such as this fairway plated with several inches of sand, is not immune to turf problems like localized dry spot (LDS).

sand capping process. Using moisture release curve data, the laboratory can evaluate whatever sand is submitted and identify the depth of that sand necessary to provide a good growing environment. Since the depth of the sand can vary widely depending on its physical characteristics, it is imperative that this type of analysis be performed very early in the project to allow accurate estimation of project cost. Knowing how the plated rootzone will perform at different depths also allows adjustments in the depth of the rootzone depending on the area. For example, shallower depths of sand can result in greater moisture retention, which will prove helpful in managing steep slopes or mounds, while greater sand depths will improve drainage in low areas or around catch basins.

This type of testing is also recommended for golf facilities desiring to evaluate their current sand capping and topdressing material. [Click here](#) to learn more about accredited physical soil testing laboratories and to find the list of labs currently accredited by the [American Association of Laboratory Accreditation](#).

### AVOIDING THE MOST COSTLY MISTAKE

Given the cost of sand capping and its influence on turfgrass performance and playing quality, it is surprising how many construction sites do not carefully test their sand. Simply put, not testing is not knowing. As an example, not long ago I visited a golf facility that had fairways and roughs capped with sand to an 11-inch depth. The sand was extremely coarse and, as a result, the facility was experiencing severe challenges with water management and localized dry spots (LDS) that were made even worse by the strong undulations of the design. A few hundred dollars spent before construction for soil testing would have eliminated these problems and saved the facility hundreds of thousands of dollars.

### DRAINAGE, DRAINAGE, DRAINAGE

Although improved internal soil drainage is a tremendous benefit of plating native soils with sand, there still



Figure 3: A thick organic layer can quickly develop on sand-capped fairways if not properly mitigated through aeration and topdressing. The result can prompt golfers to complain of “mud” on the ball during wet conditions.



Figure 4: In the absence of sufficient aeration and topdressing following bentgrass establishment, a significant thatch layer 1.5 inches thick has developed on this three-year-old sand-capped fairway.

needs to be a well-designed subsurface drainage system to collect water, especially stormwater, at the sand/soil interface to efficiently move excess water away from playing areas. Drainage engineers will utilize the laboratory test results to design a system for storm drainage. The drainage design will also be influenced by the surface contours of the course, including collection areas and the location of drainage outlets. Ideally, the drainage plan will also channel stormwater captured on the golf course to interior lakes and reservoirs so it can be used for irrigation.

## MANAGING SALTS AND SODIUM

A critical component of managing salts in turfgrass systems is drainage and the ability to flush sodium and soluble salts below and out of the immediate rootzone. While many golf facilities can flush greens and tees because they are often constructed with high-sand rootzones, flushing is severely hindered on native soils typically found in fairways and roughs. To make matters worse, it is common for very heavy and tight soils, such as clays, to be in

the same geographical area as high-sodium groundwater. For golf facilities battling high amounts of salts in their irrigation water, sand capping of these areas greatly enhances the ability to flush sodium and salts away from the turfgrass roots.

## “WHY IS THERE MUD ON MY GOLF BALL?”

How can there be mud on a golf ball from a sand-capped playing surface? Since sand, and not soil, is the primary component of the upper portion of the rootzone, what exactly causes this phenomenon to occur?

Sand capping tees and fairways creates an environment where organic matter can accumulate rapidly if not properly managed through aeration and topdressing. In fact, this same phenomenon has been observed on sand-based putting greens. The tendency for a dense thatch layer to develop on tees and fairways is even greater than on putting greens due to higher mowing heights and the reduced frequency of thatch management programs, including vertical mowing, topdressing, and aeration. Balls landing on heavily thatched turf often create

large ball marks and can become coated with organic matter that can look like mud.

Figure 4 shows the profile of a three-year-old sand-capped fairway that has not received enough aeration or topdressing following turf establishment. Notice the thatch layer is already 1.5 inches thick. Close inspection of this layer shows that there is virtually no sand blended into the organic matter itself, and thus no thatch dilution to achieve proper water and air infiltration into the soil. This creates a very problematic growing environment because the surface can remain chronically soft and wet following rainfall or irrigation, despite being sand-based originally. Soft, wet surfaces lead to poor playability and increased fungal disease activity. LDS problems are extreme and erratic because the thick thatch layer can be extremely wet or extremely dry (if hydrophobic) in areas immediately adjacent each other.

## IT’S TIME TO GET CULTURAL

A strong cultural management program must be maintained on sand-capped tees and fairways from the time of turf establishment to prevent significant

organic layers from developing. An effective cultural management program includes a combination of aeration, topdressing, verticutting, and grooming to protect the sand-capping investment. Doing so leads to healthier, more reliable turf, along with drier and firmer playing surfaces. Moreover, golf courses typically are established with aggressively growing turfgrasses on tees and fairways to achieve the playing surfaces desired today.

Figure 7 shows the profile of a sand-capped tee with significant black layer problems at the interface of the organic layer and sand. Acting much like a sponge, thatch layers often retain excess water, resulting in anaerobic conditions. When these conditions persist for too long, black layer often occurs, resulting in a very poor grow-

ing environment. Such layers can also make it very difficult to move water more deeply into the soil profile, resulting in excessively dry soil beneath the layer. As a result, the majority of the root system is confined to the thatch layer, leading to a plant that is far more susceptible to disease, insects, and other stresses.

### YES, YOU STILL HAVE TO AERATE! BUT . . .

Superintendents have found that one advantage of sand capping is the ability to utilize solid-tine aeration instead of core aeration to make cleanup much easier as well as reduce aeration time and surface disruption. This is an effective management technique if the organic zone has been properly managed since grow-in.

However, if a dense organic zone has developed, core aeration combined with heavy sand topdressing is necessary to reestablish a quality growing environment for the turf. Core aeration must completely penetrate the organic zone to provide a direct avenue for air and water to move into the sand. The most effective way of reestablishing a quality growing environment is to core aerate twice annually. Following each aeration, the cores should be processed via pulverizing or dragging. Sand topdressing should be applied as necessary to fill the holes. Deep vertical mowing on 1- to 2-inch centers and 3/4-inch deep immediately prior to core aeration is especially effective in thatch removal and the incorporation of sand into the organic layer. Additionally, solid-tine aeration or slicing may be



Figure 5: Thatch dilution preventing organic layering in the rootzone is just as important for sand-capped tees and fairways as it is for sand-based putting greens.

*Figure 6: When aeration and topdressing programs properly dilute thatch accumulation, a rootzone free of organic layers is achieved. This soil profile exhibits excellent thatch management and blending of the new rootzone (sand topdressing and organic matter accumulation) with the sand-based construction mixture below.*



required throughout the year, depending on the need for flushing sodium and salts, the tendency for LDS to develop, or if the growing season is long. Hopefully, one to two sand topdressings can be applied with these additional aerations to accelerate thatch dilution.

After thatch dilution has been achieved, or if proper cultural management has been in place since turf establishment, solid-tine aeration may be used more often than core aeration. Doing so will reduce disruption to play and, since cores are not brought to the surface, there is very little cleanup. Varying the depth of aeration and continued sand applications will help prevent the formation of a hardpan at the bottom of the aeration zone.

### THE GRADUAL APPROACH

Many golf facilities have developed their own sand capping through the use of aggressive topdressing programs over the years. Some have built up as much as three inches of sand (mixed with organic matter) over a period of four to five years using an aggressive topdressing program that included eight to ten applications per year from early spring through late fall. The most

successful approach is the application of more frequent and lighter topdressings versus only one or two heavy applications, since the latter can develop thin, problematic organic layers between sand layers. Periodic deep vertical mowing effectively prevents these organic layers, and the verticut marks are quickly masked after topdressing.



*Figure 7: If too much time elapses between sand topdressing applications, thin organic layers may develop between thin layers of sand. This creates problematic soil stratification issues within the rootzone that impede rooting and downward water movement.*

As an example, one golf facility applies slightly more than a half inch of sand per year with nine topdressing applications. With over 50 acres of tees, fairways, approaches, and intermediate roughs, this requires about 4,050 cubic yards of topdressing sand annually. These applications are accomplished in one day with two to three staff members.

### CONCLUSION

As pointed out in this article, sand capping has many benefits. However, like all maintenance practices, it must be applied correctly or it can create management and playing quality problems. Laboratory testing is the most effective means of finding affordable sand and determining to what depth it should be installed. The installation of subsurface drainage must also be considered. Cultivation practices, including aeration and vertical mowing, should accompany sand topdressing to help prevent the buildup of excessive thatch near the playing surface. The combination of these practices can greatly improve drainage, enhance the ability of the turf to tolerate poor-quality water, and ultimately improve the playing quality of your course.

**BUD WHITE** is director of the USGA Green Section's Mid-Continent Region.