

Everything you wanted to know about . . . turf aeration

BY **BRYAN WOOD**

No turf area is immune to compaction's devastating effects. Whether it's between the hashmarks, a goalmouth, or just a shortcut everyone takes through the grass, the damage from compaction is very easy to spot. When you see these visible signs of compaction they are just the "tip of the iceberg" and very likely there are similar problems are present in your soil.

The primary means of relieving compaction is aeration. You can choose many methods of aerifying for the differing conditions and situations in a given area, and each method will yield differing results. What is best? Deep or shallow tine, coring or solid tines, slicing blades, vertical linear aeration (deep power slicing)? How to choose what's right for you is the question we want to answer.

Having been in the aeration business for more than 20 years and having visited thousands of golf courses, athletic complexes, and sports fields in the US, Canada, and Mexico, I have found that the problems are all the same and the options have clear advantages and disadvantages.

Deep or shallow?

The age-old question is, should I deep tine or shallow tine? Several years ago, Dr. Houston Couch of Virginia Tech spoke on the subject of deep tine aeration and one attendee asked, "My old aerifier went three inches deep and the root system stopped there. My next aerifier went four inches deep and the roots stopped there. Now I started deep tine aerifying and my roots seem to be stopping there. What can I do now?" Dr. Couch looked perplexed and humorously responded, "And what's the problem with 10-inch roots?" That little remark encompassed my view in a nutshell. Given the choice, go deep. It's true, the root system usually does stop where

the aeration tine stops. But at 10 inches deep, the root system will support a healthy stand of turf. I have even seen 10-inch poa annua roots in golf course greens! Irrigation intervals can be lengthened, fertilizer applications can last longer, and more oxygen is introduced into the soil by using deep tine aerification. Before you start a deep tine aeration program just make sure the irrigation lines and wires are deeper than the aerifying depth. I have seen lots of "scenic fountains" pop up unexpectedly during aerification.

The old rolling type shallow aerifier is still cheap and fast, but there is minimal compaction relief and generally produces tufting around the holes. Now with the new designs of deep tine heaving machines that are faster than ever before (over 2 acres/hour), deep tine aeration is now even a more economically feasible option for multiple athletic complexes.

Due to the straight up and down (SUD) action of conventional aerifiers, compaction relief between the holes is minimal at best. SUD aerifiers, although still manufactured, are a bit out of date given the newer technologies available in aerifying. Even the vertical drilling machines produce little to no compaction relief between the holes. I recommend choosing an aerifier with a positive heave action that breaks up the compacted turf between the holes. This introduces needed oxygen, will increase the total cation exchange capacity, and can improve drainage both horizontally and vertically throughout the soil profile. Plus, at the bottom of each stroke, the heaving tine is moving horizontally as it is moving vertically, thus having a slicing plus a lifting action to the turf. This type of action minimizes the creation of a hardpan layer caused by the traditional pounding action of the old SUD aerifiers.

Rather than compressing the soil and actually adding to the compaction problem, the process of the "heaving" displaces the soil upward, raising the playing surface from "not noticeable at all" to "1/2 to 3/4 of an inch," depending on how the machine is adjusted. Matching the extent of the heave for the given soil conditions can be critical in producing good quality results.

Solid or coring tines?

Solid tines are available in either SUD or heave action aerifiers. I recommend the latter because of the minimal damage with maximum results of a heaving machine. Using solid tines with a SUD aerifier can do more damage than good. With SUD aerifiers, solid "shatter tines" will go straight in and out of the ground and can only shatter the soil if the conditions are desert like, rock hard, or bone dry. The aerifier would have a hard time driving the tines into the ground to any considerable depth without causing undue damage to the turf and the machinery. Obviously solid tines on a SUD machine are not a good choice for extended usage.

Because none of the S.U.D. aerifiers have any type of positive heave action, solid tines in these types of machines can only be used successfully as a shallow pin spiker (possibly on "in season" athletic fields), but are really only good for opening the thatch surface during high stress times. Again, this is only opening the surface, not relieving compaction. Be careful not to use this method too much or you will have a "sheep's-foot roller" effect and create a really bad hardpan layer in the soil profile. I've seen these hardpan layers so severe that not only was there a toxic gas build-up underneath but the soil also had a toxic chemical layer.



So when using SUD aerifiers, whether going deep or shallow, you should avoid using solid tines and stick to coring tines for compaction relief. Solid tines can effectively be used with deep tine "heaving-type" aerifiers with little or no damage to the turf. With solid tines ranging from 3/16 to 1 inch in diameter and 6 to 16 inches in length, the ground doesn't need to be bone dry but only needs sufficient moisture for optimal penetration and compaction relief.

On the subject of coring tines, you will find that almost all aerifiers offer some

type of coring tine. Most people think you have to pull a core for thatch removal, but the process only provides 5% of the total thatch removal necessary. About 95% of thatch control is normally maintained by verti-cutting and topdressing, or in the case of athletic fields, physical destruction by player's cleats.

Ironically, maintaining a certain amount of cushion, or thatch layer, is good and most athletic field managers would love to have some thatch in the middle of a football field. This helps protect the crowns of the plants plus keeps players from making

a muddy pigpen of the field during wet conditions. The only other advantage in using a coring tine on an athletic field is to bring soil to the surface for topdressing, but even this usually doesn't outweigh the benefits of virtually no-mess solid tines. Just order a few extra tons of topdressing material to make up for not bringing up the extra soil.

Another relatively new aeration choice for compaction relief is deep power slicing that is accomplished by driving long 10 to 16 inch blades through the soil. These blades are mounted on a rotating shaft and powered by a chain drive from the PTO driven gearbox. These blades are offset in their mounting so as to penetrate the ground in alternating fashion to create a side-to-side "wave" action to loosen the turf. These blades do not bring any soil to the surface but do provide a considerable degree of compaction relief. This type of equipment produces a continuous slit in the ground and is slightly more prone to drying or desiccation along the edges of the slice. This type of vertical linear aeration (VLA) machine can usually penetrate deeper in the same soil conditions than a reciprocating deep aerator can. Since this machine uses far fewer moving parts, it is easy and less expensive to maintain. I recommend this method for heavily compacted soils that may be extra hard or rocky and more difficult for a deep tine aerator to penetrate.

A slicing roller sounds very simple...that's because it is. Slicing, although not really intended for compaction relief, can be beneficial to turfgrasses that produce stolons and/or rhizomes such as blue, zoysia or Bermudagrasses. By slicing the stolons and rhizomes, new mother plants are created that will send out new rhizomes and stolons with a vertical growth pattern. This also gets accomplished with VLA and to a lesser degree with any of the aforementioned techniques. As far as loosening the soil, the effects are generally minimal. In fact, the compaction can be increased through the "sheep's-foot-roller" effect with extended use. Therefore, some kind of compaction relief program needs to be used. Some methods are designed with

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twisted or angled heaving knives to provide some compaction relief. These do have some loosening capabilities, but may cause damage to the turf. It is a cheap way to aerify if you can afford the healing time.

How deep?

I'm most frequently asked how often one should deep aerify. The answer is really in understanding deep aeration as a means of preventing compaction rather than relieving it. As a golf course superintendent, I deep aerified greens in spring and fall, fairways in summer and needle-tined greens during the summer months. In this way, the problems associated with compaction were greatly reduced and my turf generally flourished even in hot weather.

Sports field managers could adopt a program of deep aerating as often as desired. If you are working on a tight budget, this may determine the frequency of your aerification program. For example, if you own a machine, a program of on-going use doesn't cost much more than the occasional use, just additional top-dressing, tines, and labor. If you choose the on-going program you will find that the tremendous savings in applied chemicals, irrigation water, and greens rebuilding will more than offset the purchase price of a deep aerator.

For those with limited budgets, financing is a solution to getting this regular usage and the accompanying savings. Many customers, however, hire a contractor to get the job done. They have a couple of reasons for contracting the job out; they want to see the finished results and are relying on experience of the personnel before they make



their purchase. Also, just a spring and/or a fall deep tine aerification program yields unparalleled results as compared to conventional aerifying and is very reasonably priced by many contractors.

Be sure to choose a company who uses the best aeration equipment and employs experienced operators with the knowledge to make correct decisions for your turf conditions. Knowing the proper machine adjustments, hole spacing, tine choice, soil/ turf tolerance, and weather conditions will greatly impact customer satisfaction in terms of healing time and playability.

Whether purchasing an aerifier or hiring a contractor, the proper machine and operator, combined with the proper tines or blades for the desired application, can make the difference between satisfaction and disappointment. Just remember, don't try too radical of an approach at any one time. The main thing to keep in mind for a successful, clean job of aerifying is

not to force the machine beyond its capabilities and don't use too large of a tine or a spacing that is too close for the conditions. The soil didn't get compacted overnight and rarely can the compaction be completely alleviated in one treatment. The best route to optimal improvement is making all the right choices, and hopefully it is easier done than said. **ST**

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