

# Orange Barrels and Putting Green Aerification

*Progress has a price.*

by R. A. (BOB) BRAME

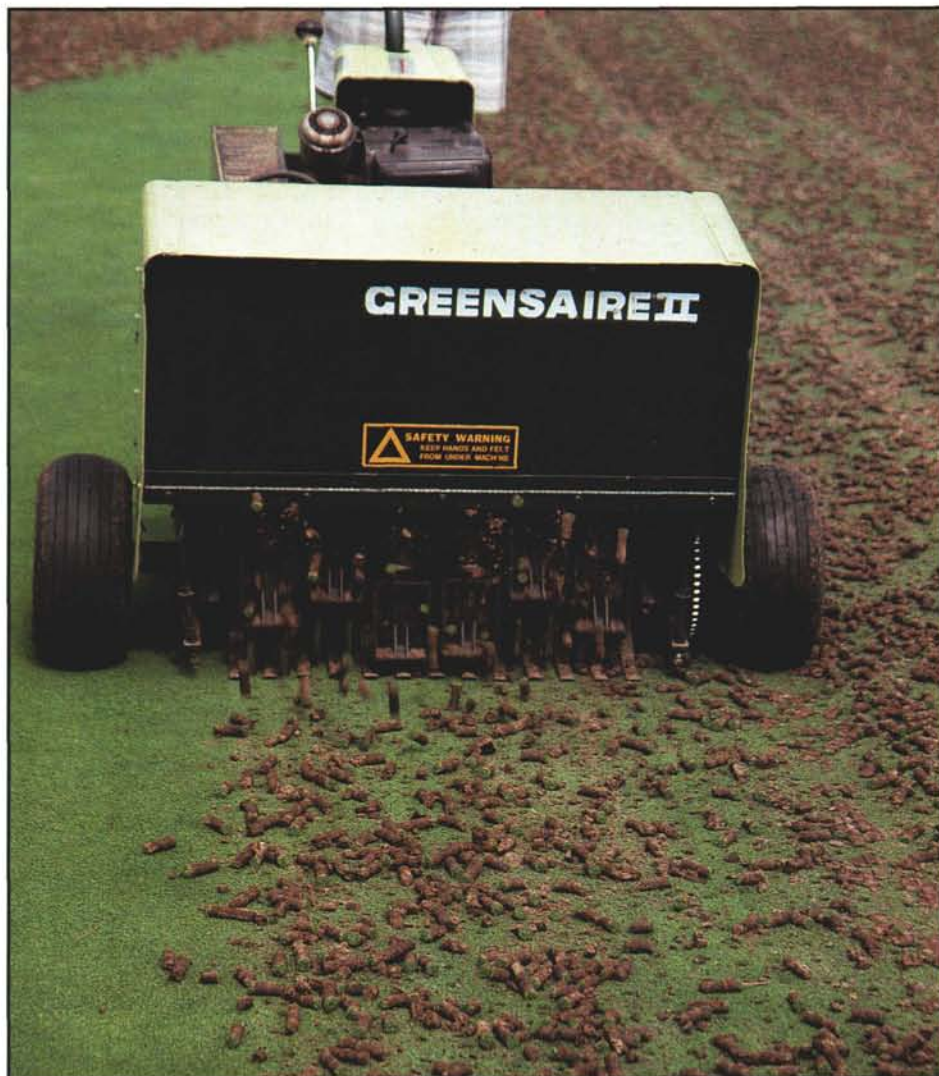
WHILE THE SIGHT of orange barrels draws contempt on our highways, it is conceded that progress has a price. In a like manner, properly timed putting green aerification will cause some short-term disruption to play. Putting green aerification is one of the most important, yet hated and ultimately compromised components of golf course maintenance. Aerification is rarely given enough credit for being an essential component in putting green maintenance. As a result, its purpose often is not defined, dates are not locked in and guarded, technique and the use of the best equipment are often ignored, and with this lack of resolve whining golfers have their way.

Golf turf management might be said to involve four essential/foundational agronomic building blocks. They are:

- **Fertilization**
- **Growing Environment**  
(sunlight and air movement)
- **Mowing**  
(type of mower being used, bench setting, and sharp blades)
- **Water Management**  
(drainage/aerification plus irrigation)

How greens are watered and aerified (water management) directly affects turf health and playability. This is especially true over the intermediate (3 to 10 years) and long haul. Limitations in one or more of these essential building blocks cannot be countered effectively with any conceivable combination of fine-tuning strategies. Although the reasons and techniques will vary, it is difficult to imagine a maintenance program that has been successful for any length of time (10+ years) that does not include aerification.

This article discusses key reasons for putting green aerification, considers general equipment categories, provides some guidelines for developing the right program at your course (customizing), and discusses how to minimize the disruption aerification causes (easing the impact of orange barrels). The



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focus is bentgrass or bentgrass-*Poa annua* putting surface maintenance in or north of the transition zone.

### Key Reasons for Aerifying Greens

There are four primary reasons for putting green aerification in routine maintenance (interseeding or regrassing would fall more towards renovation). The list includes: (1) soil compaction relief (porosity enhancement; air, water, and root movement), (2) root zone modification, (3) thatch management, and (4) surface smoothing.

(1) Root zone compaction caused by equipment, cart, and/or player traffic will compromise turf health and the resulting playability. Compaction reduces porosity, which adversely affects the free exchange of air, water movement, and root system development.

(2) The accumulation of organic matter (thatch) and fine particles (silt and/or clay) can, over time, produce a surface layer that reduces porosity. Aerification can modify the profile, improving oxygen, water, and root movement, especially when the use of hollow tines is combined with core removal and backfilling channels with high-quality topdressing sand.

(3) Thatch management, while accomplished with root zone modification, is often needed even if the root zone profile does not need to be modified. A properly built USGA specification green is an example of where thatch management via aerification may be necessary while profile modification would not.

(4) The process of punching holes and either reincorporating the plugs brought up or removing the plugs and filling channels can offer some surface smoothing. Surface topdressing alone will fill/smooth low spots. The combination of aerifying and the follow-up topdressing will, over time, both fill low spots and soften high spots, resulting in more efficient surface smoothing than topdressing alone.

### Overview of Equipment Categories

In today's golf turf industry there is a wide variety of aerification equipment available. Yet, with more options often comes more confusion in determining the best equipment to utilize. To sort through the equipment available and its usage, there are three principal categories to consider. These are: (1) conventional shallow-tine aerifiers, (2) deep-tine aerifiers, and (3) machines and/or tines used for summer management.

The first category includes a number of manufacturers with machines possessing various options. Basically, these aerifiers must be maneuverable, capable of producing reasonable tine penetration (+/- 3.5"), and offer good hole spacing (the most common standard has been 2" x 2"). Some machines offer adjustable hole spacing and/or bracket attachments to vary spacing. Speed, while often a marketing tool, is not as important as quality. The definition of "quality" is: a machine that enters and exits the playing surface without causing excessive disruption (punches straight into the surface). The second category includes aerifiers that penetrate much like the first group, only deeper. Straight entry of the tine into the surface is not as important in this category. In fact, certain deep aerifiers offer a beneficial kicking or fracturing action that is tied to an angled entry and/or exit of tines from the root zone. Water injection aerifiers and deep-drill machines would also fit into this category.

The third category, machines and/or tines utilized for summer management, is most often used to improve oxygen and/or water movement. Root zone modification, while often a goal of fall and spring conventional aerification, is not a primary objective with this category. The target is to create open channels in the soil profile with minimal putting surface disruption and turf trauma. Typically, the equipment used overlaps with the first two categories, with adjustments made in tines, spacing, and/or speed. While the equipment falling into the first two categories is normally used with reoccurring repetition, summer opening and venting is weather and traffic dependent and may not be needed every year.

### Customizing

### Compaction

The need for aerification for compaction relief can develop on soil-based greens, sand-based greens, and everything in between. Although upper profile organic matter accumulation softens the impact of equipment and player traffic, the soil structure below eventually becomes compacted. Turf quality will then decline through the reduction of atmospheric gas movement, water penetration, and root system development. To alleviate these limitations, it is common to combine deep aerification with shallow-tine aerification. This is often done with a

deep-tine aerifier like the Verti-Drain or Soil Reliever equipped with solid tines, followed immediately with a shallow-tine aerifier. Using this combination of aerifiers relieves compaction in both the upper and lower soil profile.

Water injection aerification is also used to reduce upper and lower profile compaction. However, the benefits have not been the same as conventional aerification and/or deep-tine aerification with regard to creating open channels in the root zone. This is likely because the channels do not last as long.

A well-built green will be, to some degree, compaction proof for the first few years. However, attempting to build a USGA green and missing the mark with too much silt and clay can result in compaction problems equivalent to those of poorly constructed and/or older soil root zones.

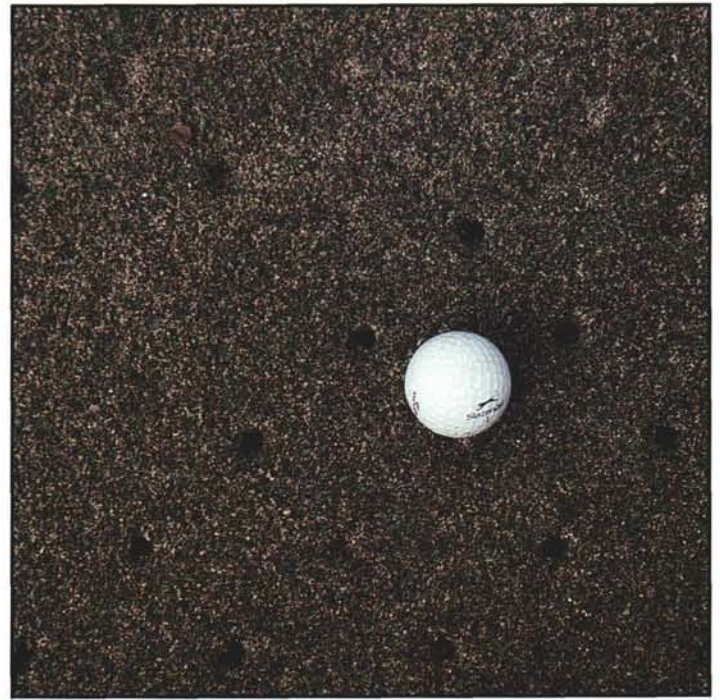
### Root Zone Modification

The second issue is root zone modification. Do your greens have an organic matter/thatch accumulation in the upper root zone? Is water moving into the profile quickly? The goal of putting surface management is to keep the top few inches of the root zone as dry as reasonably possible. Factors like root depth, soil type, weather, irrigation system, and available staff impact the baseline goal of keeping the top few inches of the root zone dry. While most of a heavy rain will run off, the water that goes into the soil profile should drain away from the surface as quickly as possible. The use of shallow-tine aerifiers equipped with hollow tines, the removal of plugs, and backfilling channels with material of good porosity will create the best possible upper profile modification, short of rebuilding.

Root zone modification programs normally target the top few inches of the soil profile with shallow-tine aerification. Occasionally, however, a deep-drill or deep-tine aerifier with hollow tines is used to modify the lower profile. This is time-consuming, expensive, and, if needed on an ongoing basis, may indicate the need for green reconstruction.

### Thatch Management

A program designed to modify the profile will also achieve some thatch control. A well-built green that has been consistently topdressed and aerified will likely not need upper profile modification. However, even a well-built green that has not been top-



*Completely filled aerification channels achieve the quickest return to smooth putting surfaces (left). Care must be taken to use dry topdressing sand so that the channels can be completely filled. If the topdressing contains any moisture, a bridging action will occur, and while the holes may appear to be filled, the sand will eventually dry and then drop into the channels (right).*

dressed consistently can develop a thatch problem. This requires pulling plugs, topdressing over them, and incorporating the mixture into the surface/holes, or completely removing plugs and filling channels. Tines only need to penetrate deeply enough for the thatch accumulation in the upper root zone to be removed. It is possible to minimize profile disruption and equipment tire depressions on the surface (often a problem with new greens) with short (cut off) coring tines. However, the tines do need to be long enough and penetrate far enough to pull a plug.

### Smoothing

Smoothing is the key reason for aerifying a new well-built green, although integrating aerification with surface topdressing will maintain a homogeneous profile. Either topdressing over the plugs brought up when aerifying a well-built green and working the mixture in, or simply incorporating the plugs/root zone back into the surface/holes will offer a smoothing action. In smoothing, as with thatch management, tines can be shortened to reduce profile and surface disruption. Aerification offers a smoothing action on older and/or poorly constructed greens as well, although the smoothing action is typically a higher need on new greens.

### Combination of Needs

In most cases, aerification is done for more than one reason. For instance, well-built greens are aerified to smooth the surface and dilute organic matter accumulation if not topdressed regularly. Soil and/or poorly constructed high-sand-content greens are often aerified to modify the upper profile, while also easing compaction and smoothing the surface. Deep aerification is often added to a maintenance program to open, loosen, and/or fracture the lower profile.

### Easing the Impact of Orange Barrels

1. *Communicate the reasons for putting green aerification.* At times, it seems some golfers think the superintendent lies awake at night pondering ways of messing up their round of golf. The lack of communication may well be the primary reason for this mindset. There are times when politics may dictate the need for a superintendent to back down and accept the golfers' desires. However, when it comes to the four agronomic building blocks outlined in the introduction, a hard line should be maintained. Even though agronomics, economics, and politics are part of every maintenance decision, it is the agronomics that protects the intermediate and long-term performance and conditioning of the

course. Make sure golfers understand why aerification is more important than, for example, edging bunkers or mowing around trees. Through newsletter articles, superintendents should explain why it is important to move water away from the surface as quickly as possible. Firm, dry surfaces equate to healthier turf and better playability — benefits that few golfers could argue with. Golfers would better understand the necessity of aerification if a hierarchy of goals were made known. For instance: (1) shallow-tine aerification targets upper profile modification, (2) deep aerification punches through the compaction zone at the bottom of shallow-tine penetration and enhances lower profile porosity, and (3) solid star tines and water injection are used in the summer to maintain positive atmospheric gas and water movement. Deep, plump, white roots growing down aerification channels dramatically communicate what "enhancing profile porosity" actually means.

A physical analysis of the soil profile by an accredited laboratory can scientifically quantify aerification requirements. This may help golfers understand why the greens are being shallow-tine aerified three or four times a year and deep aerified twice. The laboratory analysis may expose the fact that an aggressive aerification program is postponing the need to rebuild.

It is important for golfers, at least those who are interested, to understand all sides of the issue. That's what communication is all about. Don't assume anything.

2. *Equipment selection.* Golfers will be more tolerant and understanding of aerification work if surface disruption is held to a minimum. This means the greens must putt reasonably smoothly the day after aerification. To achieve this goal, use a quality machine and completely fill the holes produced by aerification.

A quality shallow-tine aerifier punches straight into the putting surface. If the tines enter at even a slight angle, the holes will be oblong. The raised or slight mounding behind the holes creates surface disruption that takes time to smooth. Even rolling the surface after using a poor-quality machine will not completely eliminate ball roll disruption. The sacrifice in speed to punch crisp round holes is worth the investment.

Completely filling aerification channels and using a quality machine will achieve the quickest possible return to smooth putting surfaces. The only way aerification holes can be completely filled is with the use of dry topdressing sand. If the topdressing contains too much moisture, a bridging action occurs and, while the holes may appear to be filled, the sand will eventually dry and then drop into the channels. The result is inefficient upper profile modification and partially open holes, producing bumpy putting surfaces. This also applies to a well-built green where upper profile modification is not a goal. It is for this reason that either topdressing (using the sand component of the construction mix that is completely dry) over plugs and incorporating the mixture into the surface/holes, or completely removing plugs and filling channels, is preferred to simply working in the plugs alone.

A key benefit of machines like the Verti-Drain or Soil Reliever is the fracturing that occurs in the lower profile. The kicking action generated by these machines usually results in some minor surface disruption. While the kicking action can be adjusted, some action is needed to provide the desired fracturing action. The soil moisture level is also important in achieving the desired fracturing. Too much root zone moisture virtually eliminates fracturing, while too little may result in significant surface damage. Following deep-tine aerification

with a quality shallow-tine aerifier can aid in smoothing the surface, while blurring the holes from deep opening. This makes it possible to stay with the typical combination of removing shallow-tine aerification plugs and back-filling channels. Using both machines holds play disruption to one time frame, while receiving the combination of benefits.

Once the reasons for aerifying greens have been established, make sure the equipment complements the goals. While water injection aerifiers can be a tool, they allow neither profile modification nor the smoothing action possible when plugs are pulled. This is actually true of virtually all machines and/or tine combinations used for summer opening and venting. There is a tendency at some courses to move toward less disruptive and/or quicker aerification strategies at the expense of doing what is really needed for turf health.

3. *Schedule properly and stay the course.* Summer aeration, to open and vent the profile, is difficult or impossible to pre-schedule. The need will vary with weather conditions, traffic, and turf health. Some flexibility, like the course being closed for one-half day on Monday, should be factored in to allow this work some latitude. Conventional and deep aerification can and should be scheduled in advance.

The best approach is to take the course calendar and enter all aerification dates before golfing events are added. Ideally, place an alternate date two or three weeks after each target date. This ensures aerification will be done, even if a temporary postponement is necessary. Weather conditions and/or weak turf/roots may force a temporary postponement — golfing events should not. With target and alternate dates on the course calendar, golfing events can be added where appropriate. Advance scheduling protects aerification, while allowing golfers to be informed. The ongoing aerification of greens is more important than any one golfing event.

When greens are being aerified, either close the entire course, nine holes, or the applicable hole(s). The best policy is to either close nine holes at a time or close the entire course. The safety and efficiency of putting green aerification will be much better if play is not allowed during the process.

While the actual timing of the target dates will vary depending upon location, the late summer/early fall time slot

is ideal. The more aggressive fall fertilization combines with the enhanced root zone porosity offered by aerification to strengthen root depth and mass. Mid-fall or mid-spring would be slot number two. Three conventional aerifications a year would normally target late summer/early fall, mid-fall, and mid-spring. Should four be needed, add late spring to the schedule. Deep aerification can be inserted just before any one or combination of the shallow-tine openings.

To achieve the quickest possible grow-over, all aerification work should be done when the turf is actively growing. Aerifying in late fall or early spring can expose the turf to more intense winter desiccation or overly wet root zones (open channels, even if completely filled as is the target, will allow more of a heavy rain to pass into the profile).

Once scheduling is completed, stay the course. Consistency is important to achieving maximum value.

## Conclusion

Ultimately, the first step toward properly aerifying greens is to acknowledge its importance. The use of high quality, properly selected equipment can combine with ongoing communication and advance scheduling to minimize the presence of orange barrels. Yet, with progress comes orange barrels.

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