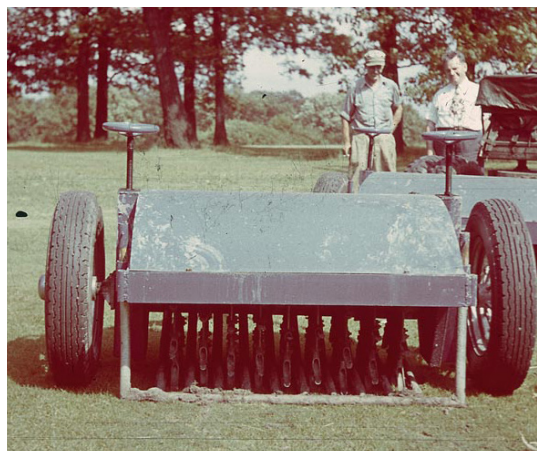


# History of Aerification

Michael Paciga

(excerpt from Mike's in depth survey)

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*West Point Aerifier; Olympia Fields Chicago July 18 1947*

Without doubt, the most critical and common agronomic practice is aerification. Aerification, or aeration, is the process of exposing the soil to oxygen. Oxygen depleted soils can often lead to summer decline of turfgrass. Golfers often believe that aeration is not always necessary and doesn't need to be performed during peak play months.

The science and agronomics involved in aeration of all finely manicured turfgrass needs to be applied to provide the conditions golfers demand during the summer months. Aeration allows turfgrass to handle the stresses of summer and provide superior playing conditions. As golf course management techniques vary among courses, the same is true regarding aeration practices. Each superintendent may be doing things a little different. There is no one correct answer: however, each superintendent is trying to pursue the same objectives. There are many different types of aerification practices ranging from hollow vs. solid to new processes such as dry-jet, hydroject, and drill and fill. Additionally, during summer months the superintendent may wish to "vent" the greens using practices such as needle tines or hydroject. The entire aerification process will be explored in this paper along with suggestions and/or applications that can speed up the recovery process of the aerification holes.

## Early History of Aerification

Generally speaking, most of the practices and/or products the turf market uses originated from the agricultural side. Aerification is similar to the process utilized by farmers when they cultivate. Aeration replaces cultivation of soil on the golf course. Farmers cultivate, or turn the soil over between crops, to redistribute the nutrients and relieve compaction throughout the profile. This practice, however, is not practical during the golfing calendar, so the process of aerification was developed. As stated by Bob Vavrek, USGA regional agronomist (2006), "Cultivation...the word is derived from the Latin word cultus, to till. Cultivating or tilling the land became important long ago when prehistoric people evolved from nomadic hunter-gatherers to farmers. Indeed, cultivation was around long before golf courses. How long? References can be found very early in

the Bible (Genesis 3:23)" (p. 9). Early turf publications don't provide information on the importance of aerification due to the disturbance to the putting surface. It was originally thought that this disruption caused damage to the root systems and its benefits were not discernible.

During the mid-1800's, the importance of getting oxygen to the rootzone was apparent to Old Tom Morris at St. Andrews. At this point in time, it was a common practice for many "greens keepers" to poison or collect earthworms for disposal because of the problems the castings caused during periods of high moisture. Statistically, earthworms can bring approximately 20 tons of soil to the surface per year over an acre of good soil. Their burrows are most numerous within the first six inches of the surface, but they can, in some cases, reach six feet below the surface. Old Tom Morris recognized the importance of this "aeration" and did not collect the earthworms. He realized the potential of this "free" aeration to the turfgrass. The tunnels created by these earthworms allow for the exchange of gases such as carbon dioxide and oxygen and the infiltration of water further into the soil profile. The oxygen supplied through aeration helps prevent the buildup of gases such as carbon dioxide, methane, and ethylene (Labbance, 2004). In the period following Old Tom Morris 40 year tenure, the greens quickly declined as his successors began collecting the earthworms. The greens began holding water after a rainfall and compaction increased from play on the course and foot traffic. The importance of aerification was clearly demonstrated by Old Tom Morris and the condition of his course.

Horace Hutchinson, author of the 1906 book, "Golf Greens and Green-Keeping" also recognized the importance

of aeration and stated, “if you remove them (earthworms), you must do something to help the richness and aeration of the ground” (Labbance, 2004, p. 2). “To supply the aeration, when there is a tendency for the ground to become packed too hard, rest and dressing are recommended, and, above all, raising the ground with a form in such a way as to loosen it and make holes in it without breaking the surface continuity of the turf” (Labbance, 2004, p. 2). At this point in history, the first aeration tool had been developed: the pitchfork. Two men would work six inches of the soil. Using a pitchfork, they would stab the ground, rock it back and forth and continue this process throughout the course. This form of aeration was very labor intensive and slow. This quickly led to the development of the next aeration tool: a hollow tine pitchfork developed in Great Britain in the early 20th century. This process was also labor intensive since the plugs needed to be cleaned up. Quicker and more efficient aerifiers needed to be developed.

In 1917, the development of a spiked roller debuted in the book, “Turf for Golf Courses.” The spiked roller was used more for topdressing and seeding. The spikes did not penetrate deep enough into the soil, and it actually caused a compaction issue in the soil just beneath the depth of the spiker (similar to what occurs when a farmer continually tills his fields or a plow pan develops). These early spikers merely pushed the soil into the subsoil. This led to the development, in the early 1920’s, of the first spiker with hollow spikes mounted on it. The developers design included hollow spikes with a slot on the side with a spring loaded mechanism to push the plug out before the roller contacted the soil again. Problems arose since the plugs needed constant attention because of constant jams. Continued innovation resulted in hand held discers that would slice into the soil (similar to today’s verticutters). Developers even added spikes to the bottom of shoes and walked the greens to achieve spiked aeration. This idea was quickly scrapped after a couple of broken ankles.

It wasn’t until the 1930’s that Chet Mendenhall, greens keeper at Mission Hills Country Club outside Kansas City and



*Wilder Strong Spiker 3-gang unit for Fairways; Toronto C. C. Can 4-21-42*

GCSAA president in 1948, developed the Turferator. This aerifier was a machine that had two rows of drills that would drill 7/8 inch holes 4 inches apart. The drill bits would go down 5 inches and then the machine would move forward 4 inches and repeat the step. A colleague of Mendenhall’s developed a turf saw in

the 1940’s that had a series of 10-inch saw blades that would cut slits about 1/2” wide into the soil. This was a good idea but the practicality was limited because it made putting very difficult, especially when putting perpendicular to the lines.

In 1946 Tom Mascaro revolutionized the greens keeping market with a machine that finally was named the “Aerifier.” Tom Mascaro was diagnosed with polio when he was child and was classified 4F by the military. He worked as a military defense subcontractor and helped develop steel struts for gliders that were used in the invasion on Normandy to fly troops past enemy



*The Aerifier trademark was registered on August 2, 1946 from website.*

lines. Tom and his brother, Tony, developed a device named the “Aerifier” which was purchased by West Point Lawn Product. Mascaro states, “It cultivates by means of curved, open ‘spoons.’ The contact spoons remove soil as the full-round hollow tine does, but the open spoons have the advantage that they can’t block up with soil. Spoons are curved to minimize tearing as they enter and leave the turf” (Labbance, 2004).



*Chet Mendenhall Shows His F. G. Aerifier; Oakwood C. C. Kansas City 3-21-49*

Future innovations led to the development of the West Point GL 5 during the 1950’s. This machine was reported to be a bear to move and turn. It was reported that it would even lift the operator off his feet when making a turn. Nonetheless, it achieved the desired results: compaction was reduced and holes were extracted to promote oxygen and water into the soil. The process of aerification has evolved considerably since Old Tom used a pitchfork. Today’s speedy machines are able to quickly and efficiently achieve the desired results. @