



# Aeration . . . Helping Turf Breathe

by Roger J. Thomas

**P**roper aeration is vital for the development of healthy turf. In the respiration process, plant roots take in oxygen and give off carbon dioxide. The degree of this exchange is governed by soil porosity, with small pores holding water for slow percolation and large pores allowing for good air and water movement.

Turf aeration by mechanical means is not new, of course. From the beginning there has been a sometimes confusing array of methods for moving air through the soil.

In the earliest days, pitch forks and home-made devices simply were rammed into the dry, compacted soil to improve penetration and relieved compaction. Since then we have drilled holes, sliced in deep cuts, cultivated, spiked, intermittently slotted, brushed, dethatched, dragged with deep pronged objects and even cultivated at sub-surface levels.

There even was a theory that

called for extremely close mowing to get air to fine cracks in the soil, a practice that proved disastrous during seasonal stress periods. Another short-lived technique was to drag a deep-pronged device through the ground, drawing up both good and poor turf, resulting in a long recovery period. Eventually, experience combined with advances in turf care science and equipment to arrive at acceptable methods for improving air and water movement in the soil.

The primary goal in aeration is healthy turf, achieved with minimal physical damage and disruption of play and appearance. Important, too, is reducing the time and costs involved in the process, which means relying on modern riding equipment that is wide enough to do an effective job as fast as possible.

**Spiking.** Spikers perhaps were the first real aeration machines, used then just as now for breaking up surface compaction to enhance the movement of air and water. Even

early tractors had spikes on their wheels for this purpose (as well as for traction). And many simple devices to crumble crust were made to attach to mowers. Later on, specialized spikers evolved for the singular purpose of penetrating the soil anywhere from ½ to 1½ inch. Spiking remains the easiest and least expensive aeration method. It can be accomplished quickly with little recovery time required, and so lends itself to simple periodic maintenance.

**Coring.** Efforts to aerate deeper came with pulling out cores. The size of these cores, or plugs, generally ranged from ¼ inch to as large as one inch in diameter. Tube-like devices called tines or spoons merely extracted three- to four-inch deep plugs of soil. Over the years the number of plugs pulled increased for the purpose of adding sand or other amendments to change soil structure, or to get water well below the surface in compacted, high-traffic

areas. Normally, a drag mat has been pulled over the area to break up the plugs and allow the soil to settle loosely in the holes.

Many different tines have been developed, including the hollow closed, open and L-shaped varieties that lift out wedges of turf. Though corn coring is somewhat disruptive, it does not seriously interfere with play or detract from appearance when a drag mat is used following the process. Ability to change soil make-up and good water and air movement have made this method popular among maintenance people.

**Blading.** Another method of aerating large areas that is gaining wider acceptance today is blading. This involves placing blades into the soil anywhere from four to six inches apart for air and water movement. Besides causing less disruption and returning an area to play more quickly than coring, blading is safer to use during stress periods for turf growth.

**Dethatching.** What to do about the buildup or organic matter, mostly dead grass and clippings, at the soil's surface has been a problem from the earliest days of turf care. Thatch, sometimes called mat, inhibits growth by preventing water and fertilizer from getting into the soil and to plant roots, and also contributes to the causes of grass diseases. When it builds up to a spongy rough putting surface, play is spoiled.

Dethatching machines were developed to cut the strands of stems and leaf sheaves which failed to decay over a period of years. Another function of this machine was to slice the runners of vascular strands and accumulate them with other extraneous matter on the surface so they could be collected and removed.

A logical evolution was a dethatcher that combined sweeping to efficiently handle the collection problem during the process. I should add that coring machines also help control thatch, as the soil they bring to the surface accelerates decay.

**Slitting and dethatching.** As the results of the dethatching were more fully appreciated, many maintenance people felt it no longer was desirable to core turf, which in addi-

tion to prolonged recovery, created weed problems by bringing seeds to the surface. They also realized severe cultivation and thatch removal at certain times of the year could seriously deter healthy turf growth.

For these reasons, more and more turf men have turned to equipment that dethatches and aerates at the same time. These machines use the slitting method which disrupts play and appearance less because little soil is brought to the surface compared to coring. They also have a cultivating affect in that the whirling blades cause a cracking action in the soil further enhancing the movement of air and water.

**Vertical mowing.** Originally, vertical mowing meant running slicing blades through the thatch and into the soil. Currently, however, there appears to be a trend toward vertical mowing with the blades set merely to "tick the tops." This technique was brought about by the development of triplex greens mowers, which maintain a consistently fine playing surface. By just "ticking the tops" rather than slicing into the soil, over a period of time thatch, grain and nap are removed without interrupting play.

The trend has also been influ-

enced by the greens mower's 60-inch cutting swath and ability to collect clippings while mowing. I should stress vertical mowing "ticks the tops" with very little slicing of runners. The speed and simplicity of this method let maintenance people dethatch more often without upsetting play — all good reasons for the trend.

**Sub-airing.** Keeping compaction at a minimum is a constant problem in high-use turf areas such as football fields, golf courses and playgrounds. Up to now tines and blades have been favored for the job. However, more recently a new method called "sub-airing" has come into broader use.

Sub-airing equipment places a series of oscillating blades four to seven inches beneath the surface. The oscillation causes tremendous vibration, shaking the soil several feet around the slits, permitting heavier and deeper penetration of water and air. If calcined clays or other solid amendments are spread prior to oscillation, penetration of these materials can be found from four to five inches below the surface. Recovery is quite quick when topdressing and fertilizer are applied following sub-airing during the best growing season. □



**ABOUT THE AUTHOR** — Roger J. Thomas is vice president of the Turf Equipment Division of Jacobsen Manufacturing Company. During his 29 years with Jacobsen, Thomas has worked closely with grounds maintenance people, golf superintendents, etc., throughout the U. S. and abroad, in developing turf care procedures and equipment. He graduated from St. Norbert College, DePere, Wis., and received his masters degree from Marquette University, Milwaukee, Wis.