

Fifty Years of Progress in Aerating Established Turf

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In the case of areas used for sports, the fields are mowed and rolled at regular intervals, and games are played regardless of how wet the ground may be. The same is true of pastures; cattle are grazed regardless of the condition of the soil. This all tends to pack the soil and allows for less penetration of air and moisture.

As air and moisture are retarded in their movement in the soil, the root growth is also retarded. This means the turf becomes less productive; the stand of grass becomes thinner and thinner, allowing the turf to become infested with all kinds of weeds which have a more sturdy root growth and can withstand these conditions better than turf grasses.

For years attempts have been made to restore turf to its normal production by the use of fertilizers, but in most cases fertilizers alone were not enough. Some means of loosening the soil for more vigorous root development was needed before the plants could digest the food offered through fertilization.

To develop a good turf plant there must be a good root system. To develop a good root system there must be a free movement of air and moisture in the soil, so we are immediately confronted with the problem of aerating soil under established turf.

Background of Aeration

On athletic fields and golf courses it becomes important that such work be done with very little evidence showing on the surface. I am going to review some of the tools that have been developed during the past 50 years in attempting to aerate the soil under established turf.

My earliest recollection of a machine of this type was a machine developed for renovating alfalfa fields. Farmers had discovered that after a few years their alfalfa fields became less productive each year until finally they had to be plowed up and reseeded. This was expensive so some one got the idea that is some means

of cultivating the soil around the roots could be devised, the fields could be kept in constant alfalfa production.

The alfalfa renovator was developed. This machine was very similar to the disc harrow except that instead of having discs, it was equipped with a series of hubs with spokes protruding as spikes. These spikes were flattened slightly at the end and had a slight curve which allowed them to come out of the ground without too much injury to the plant. At that time, I don't think anyone had thought grass of turfed areas needed cultivation.

In 1917, Drs. Piper and Oakley, agronomists for the United States Department of Agriculture published a book, "Turf for Golf Courses". In this book, one will find pictured some of the early day tools developed for turf aerification. One of these tools was called a toothed roller and was used for scarifying when applying seed or fertilizer. It shows that even at this early date they saw the need of getting fertilizer down around the roots of the plant rather than leaving it on the surface of the ground. This tool was constructed of a series of narrow rollers all on one shaft and had teeth or spikes protruding at intervals along the surface of each section of the roller. It was a rather large roller and was horse-drawn so we presume it was for fairway work.

One of the earliest machines developed for aerifying greens and small areas was a discer consisting of ten small discs mounted on a frame with a handle for pulling by hand. Weight could be added to force the discs into the ground. The discs were straight and did not turn up the sod like a disc harrow would. It made straight cuts through the turf which would allow air and moisture to penetrate to the root zone. The discs were set about two inches apart so by cutting the area both ways, one had the turf cut into blocks about two inches square.

During the next few years, most attention seems to have been turned toward the pin type roller spiker and there were a number of different types made and put on the market. The rigid spike in this type spiker made a much larger hole at the surface than it did at the end of the spike, so a roller spiker was developed with the spikes mounted on bars running lengthwise with the roller. The bars were loose at the ends allowing them to turn so the spikes would come straight out of the ground without tearing the holes larger at the surface. Light springs would pull the bars back in place as soon as the spikes came out of the ground.

Hard Work by Hand

The potato fork or the manure fork was introduced as a means of opening the soil to a greater depth to allow for good root penetration. A fork of this type can be forced into the ground to a depth of six to eight inches and by working the handle back and forth the soil can be broken between the fork holes.

This was the first type of cultivation used that worked the soil enough under heavy turf to allow air and moisture to penetrate deep into the root zone and really benefit the grass.

The next development along this line was the hollow tine fork. Briefly, this fork consisted of six hollow tines, 7/8 inches in diameter and 4½ inches long, tapered at the end and with a slot in the side of the tubing to eliminate plugging. The end of the tine is a solid band. The tines are spaced at 4 inch intervals. This type of fork cuts clean holes in the soil which will stay open indefinitely. They also allow for changing the structure of the soil by adding new material.

All forking work has one drawback: it is a slow process, hard work and rather expensive.

As we move along into the mechanical age, some one developed a machine known as the turferator. This machine consisted of two rows of drills spaced so they drilled 7/8 inch holes about four inches apart. It was operated by a motor. The drills were set with an automatic trip so they all went down at once. When they reached a depth of five inches, the trip released and the bits all came up at once and the whole machine moved forward four inches and the bits went down. This was a great labor saver; one man could do the work of six men with hand forks.

One of the more recent machines developed is the turf "Aerifier". The principle of this machine is the sub-surface tearing action produced by a series of spoon-shaped spikes mounted on individual discs and bent at a 30 degree angle for proper soil penetration. Depth of penetration of the spoons can be adjusted up to five inches by raising or lowering the supporting side wheels. The adjusting wheels can be set to raise the spoons clear of the ground for transporting the machine. Since each disc operates independently on the center shaft, there is very little tearing of the surface turf as spoons enter and emerge from the soil. As each spoon emerges from the soil, it removes a small core that is left on the surface. These cores can be broken up and distributed over the surface by dragging the area with a wire drag mat.

The most recent development is the Turf Saw. This machine has been developed in Kansas City by one of the local greenkeepers. It consists of a series of 10-inch saw blades mounted on a shaft spaced four inches apart. The saws are pushed in front of the machine which is propelled by a 20 horse-power gasoline motor. The saws can be raised out of the ground by means of a lever for turning the machine around, and by means of an adjusting lever, the saws can be adjusted to a depth of up to 5 inches. The notch cut by each saw blade is about ½ inch in width.

Primary purpose of this machine is for use on putting greens with the idea in mind that the saw notches would serve two functions: first, allow for the penetration of air and moisture, and second, that by cutting the notches from the higher to the lower parts of the greens it will also allow for a certain amount of drainage, in times of excess rain. The dirt removed from the trenches cut in the soil can be worked down and serve as a top dressing.

U of Mass Turf Conference March 10-12, Amherst

Annual turf conference at University of Massachusetts, Amherst will be held March 10, 11, 12, with Agronomy dept. of University and Mass. section, New England Turf conference, cooperating in presenting a practical program. Emphasized will be discussion of hidden costs in course maintenance for which increased demands of players are responsible.