
The Wisconsin Survey

AERIFICATION 1994: Today's Techniques and Tomorrow's Trends

By Robert J. Erdahl

Close your eyes for a moment and pretend you are back in 1989. Imagine you are sitting in the audience at the XYZ Turf Conference and Dr. Root is presenting a summary of his work with a machine that blasts holes in the soil with high pressure water. "Core aerification may be a thing of the past!" Dr. Root proudly concludes. You nudge your friend next to you with your elbow and whisper, "I hear Dr. Root's reputation for growing grass is matched only by his penchant for smoking it!" Dr. Root leaves the podium to a polite, but less than enthusiastic, round of applause.

The next speaker is Joe Tine, a golf course superintendent from Compaction Country Club. His topic is "Aerification—The Deeper, The Better." You turn to your buddy and say, "Now we're getting somewhere!" After the lights go down and the first few slides have been shown, however, your buddy has to reach over and lift your jaw off of the floor and check your pulse to see if a call to 911 is necessary. You are in shock because Mr. Tine has just shown pictures of a tractor-powered machine punching huge holes in a putting green. "Take my word for it," Mr. Tine assures his audience, "The putting surface is as good as new in less than two days!" That's it! Enough of Dr. Root and Mr. Tine. You leave the room to get some fresh air and hopefully some sense back into your head.

Fast forward now to 1994. You are standing on your ninth putting green. In front of you are two machines; one is blasting holes with high pressure bursts of water and the second is punching holes that could swallow a rolled up newspaper. And guess what? You are trying to decide which one to buy! What seemed impossible and/or crazy just a few years ago is about to become a part of your normal aerification program. Yet, how can you be sure that these new machines are truly better than your current aerifica-

tion technique and not just a different and more costly approach to the same end result? Even after a demonstration on your own golf course, you may still have lingering concerns. Well, how about asking some other golf course superintendents what they think about the current and future state of aerification equipment and techniques. Better yet, why not let me ask the questions. That's right, it's time for another survey! My subject this time is "Aerification 1994: Today's Techniques and Tomorrow's Trends."

I realize my introduction to this article takes a rather flippant view of some recent changes in aerification equipment. There is no doubt in my mind, however, that aerification is one of the single most important aspects of a successful golf course management program. And while we all know the agronomic reasons for aerification, I think most of us could benefit from the aerification experiences of our fellow WGCSA members. With this in mind, I sent out the 1994 Aerification Survey to fifty superintendents at all different types of Wisconsin golf courses—private, daily fee, resort and municipal. Many thanks are due the thirty-two superintendents who took the time to fill out and return the surveys. It is

their answers that make this article possible.

The 1994 Aerification Survey is divided into four subjects: Putting Greens, Tees, Fairways and Roughs. For each subject, the following questions were asked:

1. When do you aerify?
2. What machine(s) do you use?
3. What type of tine(s) do you use?
4. How do you handle your cores?
5. Do you use a soil amendment?
6. Do you overseed in conjunction with aerification?
7. Do you fertilize in conjunction with aerification?
8. Any additional comments?
9. What would you like to have to make your aerification program more successful?

I think the best place to begin our aerification discussion is putting greens. Why? Well, for most of us, putting greens provide our biggest aerification challenge. And like many other aspects of golf course management, aerification techniques used on putting greens always seem to filter down and show up in our tee and fairway aerification programs.

While I waited for the surveys to be returned, I took some time to look

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TABLE 1

Comparison of Machines Used for Putting Green Aerification in the 1989 and 1994 Wisconsin Surveys

| Machine | 1989 ¹ | 1994 ² |
|---------------------|-------------------|-------------------|
| CoreMaster | 2 | 2 |
| Floyd-McKay | — | 1 ³ |
| Jacobsen AeroKing | — | 1 |
| Ryan Greensaire | 17 | 14 |
| Ryan GA-60 | — | 2 |
| Toro Greens Aerator | 12 | 11 |
| Toro Hydroject | — | 7 |
| Verti-Drain | — | 6 ⁴ |

Values indicate number of golf courses in each category. Golf courses may be listed more than once in each year.

¹25 golf courses were surveyed in 1989.

²32 golf courses were surveyed in 1994.

³Only four putting greens were aerified.

⁴Two golf courses aerified selected putting greens.

TABLE 2

Comparison of Scheduling for Putting Green Aerification in the 1989 and 1994 Wisconsin Surveys

| Time of Year | 1989 ¹ | 1994 ² |
|-----------------------------|-------------------|-------------------|
| April | 0 | 4 |
| May - Before Memorial Day | 3 | 8 |
| Week after Memorial Day | 9 | 2 |
| June | 17 | 5 |
| July | 0 | 5 |
| August | 0 | 7 |
| Labor Day - September 15 | 10 | 10 |
| After September 15 | 4 | 10 |
| Once a month, May-September | 0 | 3 |

Values indicate number of golf courses in each category. Golf courses may be listed more than once in each year.

¹25 golf courses were surveyed in 1989.

²32 golf courses were surveyed in 1994.

TABLE 3

Comparison of Tine Sizes Used in Putting Green Aerification in the 1989 and 1994 Wisconsin Surveys

| Tine Size | 1989 ¹ | 1994 ² |
|-----------------|-------------------|-------------------|
| 1/4" Quadratine | 1 | 4 |
| 3/8" | 3 | 2 |
| 1/2" | 18 | 18 ³ |
| 5/8" | 3 | 4 |
| 3/4" | 0 | 3 ⁴ |

Values indicate number of golf courses in each category. Golf courses may be listed more than once in each year.

¹25 golf courses were surveyed in 1989.

²32 golf courses were surveyed in 1994.

³Two golf courses use 1/2" solid tines on the Verti-Drain.

⁴All three golf courses use 3/4" solid tines on the Verti-Drain.

back at the "Putting Green Management" article I wrote for the July/August 1989 issue of *THE GRASS ROOTS*. As I reviewed the segment on aerification, I wondered how many changes in putting green aerification I was going to discover in my 1994 aerification Survey. If the answers on my own survey were any indication, things had changed quite a bit in the last five years.

As the surveys began to come in, it didn't take a genius to conclude that putting green aerification had indeed come a long way in five years. To see just how far, let's take a look at the three Tables (1, 2 and 3) that compare the three questions that were asked in both the 1989 and 1994 surveys. Before taking a look at the numbers, I must point out that the 1989 survey only had twenty-five respondents, so direct comparisons with the 1994 survey are not always possible.

As you can see in Table 1, the number of different types of machines used to aerify putting greens increased from three in 1989 to eight in 1994. It appears that the three machines used in 1989 still maintain their popularity in 1994. However, the numbers clearly show a shift to the more high-tech aerification offered by the Toro Hydroject and the Verti-Drain's deep tine approach to aerification. In addition, two superintendents are successfully using Ryan GA-60s on their putting greens. A GA-60 on putting greens! Those guys have a lot more chutzpa than I do! Also note that one superintendent was happy with the results after aerifying four of his problem putting greens with the Floyd-McKay unit. And oh yes, the Jacobsen AeroKing was able to crack into the survey at one golf course.

The scheduling of putting green

aerification has changed quite dramatically since 1989. Table 2 shows us that putting green aerification has been moved closer to both ends of the golfing season by many superintendents. Unfortunately, this seems to be based on the need to stay out of the golfers' way rather than any newly discovered agronomic principles. Just take a look at April. We used to aerify putting greens in April for only one reason—winterkill. Now, four golf courses actually plan their putting green aerification that early! Also look at the relationship of Memorial Day to putting green aerification. For many of us, the week after Memorial Day used to be a perfect time to aerify our putting greens. Not any more; now many superintendents are aerifying their putting greens before Memorial Day—in many cases in very early May. Skipping past June, July and August for a moment, let's look at the numbers for September. While the week immediately following Labor Day remains popular, the latter part of September has now become the time for putting green aerification at many golf courses. Once again, putting green aerification has been pushed out of the way of the golfers.

Let's return now to June, July and August. Who actually schedules putting green aerification in the summer? That's right, the boys (Sorry, not politically correct!) with the Toro Hydrojects! All five superintendents with Toro Hydrojects have a summer putting greens aerification schedule that calls for monthly or as needed treatments. The two extra golf courses listed in August always try to core aerify their putting greens right before their summer employees go back to school. The last schedule listed in Table 2 is for the three Toro Hydroject owners

who also use their machines in May and September.

One final comment about the results in Table 2. Hidden in the numbers is the fact that in the 1989 survey only two golf courses aerified their putting greens twice in a single season. In 1994, there are ten golf courses that plan on core aerifying their putting greens twice. In addition, all seven Toro Hydroject owners will be using their machines to make multiple aerifications of their putting greens. And finally, there is one superintendent that Verti-Drains in the Spring and uses conventional core aerification in the Fall.

The final comparison between the 1989 and 1994 surveys is summarized in Table 3. The results show that 1/2" tines are still the favorite for core aerification of putting greens. Note that two golf courses listed in the 1994 1/2" tine category use 1/2" solid tines mounted on the Verti-Drain. The increase in the use of 1/4" quadra tines is due mainly to the desire of superintendents to overseed bentgrass into small, shallow aerifier holes. In the 3/4" tine category, all three golf courses use the solid 3/4" tine with the Verti-Drain.

Before I move on, I feel it is necessary to expand a little on the use of the Toro Hydroject and the Verti-Drain. These two machines seem to be changing the way many superintendents approach putting green aerification (do I detect a couple of Band-wagons?), so I think some further comments are prudent.

In the case of Toro's Hydroject, three owners are planning to entirely eliminate core aerification of putting greens unless it becomes absolutely necessary. Two other users have plans to core aerify their putting greens in either Spring or Fall in addi-

TABLE 4

Top Dressing Material Used to Fill Putting Green Aerification Holes in the 1994 Wisconsin Survey

| Material | No. of Golf Courses |
|--------------------|---------------------|
| 80-10-10 Mix | 1 |
| 80-20 Mix | 9 |
| Badger Mining BB7 | 1 |
| USGA Spec Sand | 7 |
| Lakeshore TDS 2150 | 9 |
| Waupaca Sand | 2 |

tion to their use of the Hydroject. Still another superintendent plans to use the Hydroject all season long (May-September) and supplement those treatments by using the Coremaster equipped with $\frac{1}{4}$ " quadra tines. The final member of the "Hydroject Club" has a long-range contingency plan that calls for core aerification of the putting greens every three years.

Does the Toro Hydroject really work? Judging from the responses of the seven superintendents in this survey, the Hydroject appears to be doing a good job. Can it eliminate core aerification of putting green? I think you need a crystal ball to answer that question.

Now let's take a look at the Verti-Drain. I'll admit that I harbor a bit of prejudice on this subject because I have used the Verti-Drain for the past two years on my putting greens and have been very happy with the results. I use $\frac{1}{2}$ " solid tines; but three of my braver colleagues prefer to use the $\frac{3}{4}$ " solid tine. One of the superintendents that uses the larger solid tines also core aerifies his putting greens in the Fall. The other two golf courses that use a Verti-Drain rely on it to alleviate drainage problems in their poorest putting greens. Now the two important questions. Does the Verti-Drain work? I think that both my own experience and the results of the survey yield a definite yes. Will use of the Verti-Drain eliminate the need for conventional core aerification of putting greens? I think I'll give that one a definite *maybe*.

The treatment of aerifier cores among the survey respondents is fairly straightforward. Twenty-three superintendents remove the cores entirely and only two chop and drag the existing soil mix back into the aerifier holes. Note that the two golf courses that recycle their cores have a very high sand content in their soil mixes. The three golf courses that use the Toro

Hydroject along with the four Verti-Drain users did not generate any aerifier cores.

The summary of the top dressing material used to fill the aerifier holes at the twenty-four golf courses that fill their aerifier holes with top dressing and at the four golf courses that fill their Verti-Drain holes with top dressing is shown in Table 4. Straight sand wins out over the sand-based mixes by nineteen to ten. Among the sands, Lakeshore TDS 2150 is the clear favorite.

The correlation of fertilization to putting green aerification in the survey is as follows: Twenty golf courses fertilize prior to aerification (one-two weeks prior is typical), seven golf courses fertilize during aerification (their goal is to get the fertilize into the aerify holes), and five golf courses do not fertilize in conjunction with aerification. It comes as no surprise that the five golf courses that do not fertilize in conjunction with aerification are the ones using the Toro Hydroject; with such little disruption of the putting surface, there is no need to fertilize the turfgrass to encourage it to grow over the aerifier holes. The types of fertilizers used range from commercially available "Greens Fertilizers" and "Starter Fertilizers" to personalized mixes that might include Milorganite, potassium sulfate and monoammonium phosphate. The rate of nitrogen applied varied from 0.25-1.00 pounds of nitrogen per thousand square feet. One additional note on fertilizer, four superintendents apply a granular wetting agent in conjunction with aerification in order to get it down into the aerifier holes.

On the question of overseeding, twenty-six out of a possible thirty-two superintendents responded that they overseed bentgrass during putting green aerification. Among those twenty-six superintendents, the choice between a Spring or Fall overseeding was equally divided. The twelve superintendents that specified their choice of bentgrass for overseeding putting greens were equally divided among PennCross, PennLinks, Putter and SR 1020.

In paging back through the 1989 survey, I found that there was almost a unanimous opinion among the superintendents at that time that overseeding bentgrass during putting green aerification was a waste of time and money unless the green was substantially damaged by winterkill or dis-

ease. How attitudes have changed! Either we all must have found a great new way to get overseeded bentgrass to succeed in putting greens or we are all desperate to introduce some "new blood" into our putting greens. I have a hunch that it is the latter.

The final survey question on the aerification of putting greens deals with what I like to call a "Wish List". In other words, what would it take to make the task of putting green aerification more successful at your golf course? It should come as no great shock that most superintendents responded with requests for more and

(Continued on page 25)

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TABLE 5

Scheduling of Tee Aerification in the 1994 Wisconsin Surveys

| Aerifications per Season | Month of Aerification ¹ | |
|--------------------------|------------------------------------|----|
| One 16 | April | 3 |
| Two 14 | May | 9 |
| Three 1 | June | 10 |
| More than Three 1 | July | 1 |
| | August | 2 |
| | September | 15 |
| | October | 4 |

Values indicate number of golf courses in each category.

¹Golf courses may be listed more than once in each year.

(Continued from page 23)

better equipment. What follows is a listing of the type of equipment that superintendents would like to have along with the number of superintendents making that request: Verti-Drain (9), Toro Hydroject (7), Quadra tine capabilities (3), better aerification machines in general (8), and more equipment to speed up the job (8).

Once again we see that the Verti-Drain and Toro's Hydroject are becoming very popular. Additional requests by the superintendents were for better overseeding techniques, better techniques for filling aerifier holes and being able to aerify putting greens when it is agronomically beneficial rather than when it is the least offensive to golfers.

Earlier in this article, I stated that it was likely that techniques used in putting green aerification would probably show up in our discussion of tee aerification. Looking through the survey responses, it appears that thirteen of the superintendents manage their tees exactly like their putting greens when it comes to aerification. That said, I'm going to continue this discussion of tee aerification without any further references to putting green aerification.

The summary for the scheduling of tee aerification is found in Table 5. Superintendents were pretty evenly divided between one (sixteen) and two (thirteen) tee aerifications per season. One ambitious superintendent schedules three tee aerifications per season. The one entry in the more than three tee aerifications per season belongs to the single Toro Hydroject user. The most popular time of the year to aerify the tees is a toss up between Spring (May and June) and Fall (September and October). The golf courses that aerified only once per season were also equally divided be-

tween and Spring and Fall. Many superintendents stated that the scheduling of tee aerification was not a major issue because it can be managed to limit its impact on golfers. In my case, I sometimes stretch out the tee aerification process on my twenty-seven holes for up to two weeks depending on the weather and the amount of play.

Table 6 shows us that the choice of machines for tee aerification is fairly even between Ryan (fifteen) and Toro (twelve). Four superintendents make short work of their tee aerification by using the Ryan GA-60. And finally, the sizes of the tines used in tee aerification seem to indicate that bigger aerifier holes equal healthier tees.

For core treatment after tee aerification, eighteen superintendents chopped the cores and dragged them back into the aerifier holes and fourteen superintendents removed the cores. On those fourteen golf courses where the aerifier cores were removed, the choice of soil amendment to fill the aerifier holes was evenly split between pure sand (seven) and an 80/20 mixture (seven).

For fertilization in conjunction with tee aerification, seventeen superintendents fertilized before aerification, seven during aerification and eight did not fertilize based on the tee aerification schedule. The types of fertilizer used covered a broad spectrum: from organic, slow release nitrogen sources to water soluble, quick release nitrogen sources. The rate of nitrogen varied from 0.25-1.00 pound of nitrogen per one thousand square feet.

The seed of choice for overseeding during tee aerification was PennCross by a landslide. Timing of the overseeding slightly favored Fall (fourteen) over Spring (ten) with eight superintendents choosing not to overseed in conjunction with tee aerification.

The "Wish List" for tee aerification included the following requests along with the number of superintendents making the request: Aerify more often (6), Verti-Drain (5), and Toro Hydroject (3). The shortness of this list seems to reinforce my earlier comments that portrayed tee aerification as something far less than a situation that would call for "Roloids".

"Do you really have to do this to the fairways?" That was the comment of one of my members after he had just finished playing through three fairways that were in the dusty cleanup stages following aerification. Naturally I said

TABLE 6

Tee Aerification Machines and Tines Used in the 1994 Wisconsin Surveys

| Machine | | Tine Size | |
|---------------------|----|-----------|----|
| CoreMaster | 2 | 1/2" | 15 |
| Jacobsen AeroKing | 1 | 5/8" | 14 |
| Ryan Greensaire | 15 | 3/4" | 6 |
| Ryan GA-60 | 4 | | |
| Terra 200 | 1 | | |
| Toro Greens Aerator | 12 | | |
| Toro Hydroject | 1 | | |

Values indicate number of golf courses in each category.

Golf courses may be listed more than once in each year.

yes, and then proceeded to remind him that I had announced the fairway aerification well in advance in committee meetings, on bulletin boards and in the monthly newsletter. He walked away, still a bit miffed and very dusty. I'm convinced that a scene similar to this is being played out at most golf courses in Wisconsin at some time during the course of the year. Why? Because superintendents have found that one of the best ways to meet the growing demands placed on their fairway turfgrasses (both *Poa annua* and bentgrass) is aggressive aerification. Let's cut to the survey and see if I'm right.

How often do you aerify fairways? In the survey, nineteen superintendents did it once a year and the remaining thirteen superintendents did it twice a year. For the nineteen golf courses aerifying fairways once a year, four prefer a Spring schedule and fifteen accomplished the task in the Fall. For the golf courses aerifying fairways twice a year, the scheduling was usually set for early May and mid-late September. Once again, we see the in-

TABLE 7

Fairway Aerification Machines and Tines Used in the 1994 Wisconsin Surveys

| Machine | | Tine Size | |
|----------------------|----|-----------|----|
| CoreMaster | 2 | 1/2" | 8 |
| Jacobsen AeroKing | 1 | 5/8" | 14 |
| Rogers 590 | 1 | 3/4" | 13 |
| Ryan GA-30 | 1 | | |
| Ryan GA-60 | 12 | | |
| Ryan Greensaire | 2 | | |
| Ryan Renuvaire | 3 | | |
| Terra 200 or 320 | 4 | | |
| Toro Fairway Aerator | 2 | | |
| Toro Greens Aerator | 5 | | |
| Toro Hydroject | 1 | | |
| West Point | 6 | | |

Values indicate number of golf courses in each category.

Golf courses may be listed more than once in each year.

evitable consequences of sharing our golf courses with the golfers as our fairway aerification programs are squeezed to both ends of the golf season.

Looking at the numbers in Table 7, the Ryan GA-60 stands above the crowd in popularity. Based on my own experience, I can assure you that the GA-60 merits that popularity. I purchased a GA-60 two years ago and can best describe it as an awesome machine. During those two years it has performed without a hitch and has significantly improved my fairways. The survey comments of the eleven other superintendents that own GA-60s were similar to mine.

To amplify the popularity of the GA-60, I'm going to jump ahead in the fairway aerification discussion and cover the "Wish List". Twelve superintendents indicated that the GA-60 would be their choice for fairway aerification. Other requests along with the number of superintendents making the request are as follows: Aerify in June (5), aerify more often (5), Verti-Drain (4), Toro Hydroject (3), overseed with bentgrass (5) and top dress (1).

Before we leave Table 7, let's take a quick look at the tine size summary where the trend is definitely towards the larger tines. Many superintendents made the comment that the main purpose of their fairway aerification program was to bring as much soil to the surface as possible in order to control the thatch brought on by their light-weight mowing programs.

The solution for fairway aerification cores is solved two ways in the survey. Twelve superintendents chop up the cores using a machine such as a Jacobsen Turfcut with an outfront flail mower and then drag the chopped cores into the fairway. The remaining twenty superintendents use some type of drag mat to both break up and drag in the cores. Eight golf courses have enough debris remaining following the

dragging that a blower must be used to clean off the fairways.

The soil amendment or top dressing discussion for fairway aerification is understandably brief. None of the golf courses in the survey are currently top dressing their fairways. If you include approaches in this discussion, there are three superintendents top dressing their approaches with pure sand and another two that are using an 80/20 mixture.

How many golf courses are trying to improve their fairways through overseeding at the time of aerification? Six superintendents are overseeding all of their fairways, eight are spot seeding and eighteen do not overseed at all. Among the fourteen overseeders, the seed of choice was a toss up between PennCross and PennEagle.

The decision on whether to fertilize in conjunction with fairway aerification split the survey results right down the middle. The half that responded affirmative usually fertilize one-two weeks prior to aerification. The types of fertilizer used and the rates of nitrogen applied were not specified by enough of the superintendents to justify any discussion.

Before we leave fairway aerification, I'd like to share some interesting comments on earthworms. One superintendent explained how the intense earthworm activity on his golf course was his primary source of fairway aerification. A second superintendent stated that he did not machine aerify several of his fairways due to the active earthworm population. Now mind you, I have nothing against earthworms, and I know that earthworms are great friends of the soil, it's just that sometimes they can make quite a mess out of my fairways!

After all that aerification, do we still have time for the roughs? For seven of the superintendents in this survey, the answer is NO; they just don't have

the time, the employees and/or the equipment to tackle such a large scale project. Another eleven golf courses aerify the wear areas in their roughs. This typically occurs in the Fall and is accomplished with a variety of machines (fitted with 1/2-3/4" tines) and is usually accompanied by fertilization and overseeding.

That leaves fourteen golf courses that aerify their roughs "Wall to Wall". In this group, eleven aerify in the Fall, one in the Spring and one all season long. The machines used tend to be low-tech, like the West Point (seven golf courses), but the Ryan GA-60 is used by three superintendents and Toro Greens Aerators are used at two golf courses. Aerifier cores are dragged in by ten superintendents, chopped and then dragged in at three golf courses and just left alone on the remaining golf course. Overseeding in

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the wear areas with blends of blue-grasses and rye grasses is practiced by six superintendents. And finally, six superintendents (not necessarily the same ones who overseed) plan the fertilization of their roughs to coincide with aerification.

For a rough aerification "Wish List", the most popular request (ten superintendents) was for more time to do the job. Other requests along with the number of superintendents that made the request include: Better machines (6), Ryan GA-60 (4), Verti-Drain (2) and Aerway (1).

OK, now what have we learned about aerification? Well first off, we

should have all been reminded just how important all those aerifier holes really are! Whether they are little or big holes, they provide the life line for our turfgrass plants during times of stress. Secondly, we must continue to both beg and bully our golfers into allowing us to aerify when it is agronomically beneficial to the turfgrass plant rather than convenient for the golfers. And finally, even if nothing else has been accomplished by this article, it will provide us with an "Aerification Benchmark" from which we can compare today's aerification techniques with those of both yesterday and tomorrow. 🌱

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