The top ten reasons to lightweight roll

One of the world's most eminent turf professors – and a huge hit at the Turf Managers' Conference – gives us a detailed lowdown on lightweight rolling

When I initiated my first lightweight rolling putting green study at Michigan State University (MSU) in 1993, I had no idea I would still be researching it 20 years later. In the nineties, the initial objective of lightweight roller research was to gather data to determine whether the practice was safe. Questions abounded about whether rolling frequency should be limited because it might increase the possibility of compaction and plant tissue bruising or contribute to the movement of diseases spread by mechanical means.

Just ten years ago lightweight rolling was primarily used to alleviate frost heaving, prep seed beds or increase green speed for tournaments - if it was used at all.

Today, because of unexpected results from numerous studies, lightweight rolling has been embraced as a means of creating healthy turfgrass and increasing customer satisfaction.

Because of my extensive research with the practice, I have repeatedly been asked to list 'The Top Ten Reasons to Lightweight Roll.' I'll admit to originally scoffing at the idea, but the truth is, I was the perfect individual to create such a list, and I finally gave in to the requests. So here we go!

10. Alleviate heaving and minimise scalping when climatic conditions dictate

The numerous freeze/thaw cycles that occur in temperate regions of the world result in soil frost heaving which leads to bumpy soil surfaces in the spring.

It is customary to roll turfgrass surfaces before the first spring mowing to minimise the potential of scalping.

Similarly, when heavy rains are followed by hot humid weather, thatch can swell, creating puffy turf that is more prone to scalping. Under these climatic conditions, rolling before mowing can decrease the potential of scalping.

9. Seed bed preparation

Rolling is important for the establishment of turfgrass sites for several reasons. First of all, on high value areas, it is imperative to roll the site multiple times before seeding to compress the root zone and reduce or eliminate soil settling during or following establishment.

Second, numerous turfgrass books rightfully preach the importance of having good seed-to-soil contact during the establishment of turfgrass sites, and the best way to have good seed-to-soil contact is to roll the site immediately after seeding.

Additionally, in a putting green establishment study performed at MSU, plots rolled multiple times per week filled in quicker and were ready for play sooner than putting green plots that were not rolled.

8. Broadleaf weed, moss, algae reduction

No research plots have ever been designed to examine the impact of lightweight rolling on broadleaf weeds, moss or algae encroachment, yet related research has documented that lightweight rolling decreases each of them. In an MSU study in 1996, putting greens rolled three times per week had fewer broadleaf weeds and less moss than greens that were not rolled.

Furthermore, in 2008, University of Arkansas Masters student Jay Richards reported that lightweight rolling decreased algae encroachment.

Exactly why regular lightweight rolling would decrease these pests is not known, but two different theories have the most merit.

The first is that regular rolling increases turfgrass density thus reducing the potential of the pests. The other theory is the pests (especially moss) simply cannot tolerate the traffic put upon it by continuous rolling.

7. Decreased localised dry spot

A lightweight rolling study performed at MSU from 1995 to 2000 revealed that greens rolled three times per week displayed significantly less localised dry spot than greens that were never rolled. Soil samples from the study showed that rolled plots retained more moisture and had more root mass than root zones that were not rolled.

Obviously, increased soil moisture content and root mass could lead to less localised dry spot on the turfgrass putting surface.

In the past several years it has become easier for researchers and golf course superintendents alike to measure volumetric soil moisture content because Time Domain Reflectometry (TDR) technology has been vastly improved. TDR measurements taken on lightweight rolling studies have consistently shown that lightweight rolling does increase soil volumetric moisture content.

6. Height of cut raised and green speed retained

Figure 1 (below left) shows green speed measurements from the very first mowing height/rolling study. Plots mowed at 0.5cm were rolled three times per week and were compared to plots that were not rolled and were mowed at 0.4cm.

At the beginning, plots maintained at the higher height of cut had slower green speeds compared to plots mowed at the lower height of cut. However, after a week and a half of rolling, plots maintained at the higher height of cut achieved green speeds as fast as (and in some cases faster than) plots mowed at the lower height.

Interestingly, rolling resulted in enough residual green speed that the higher height of cut maintained the green speed of plots at the lower height of cut the day after rolling. Since that original study, several other studies have been performed that validate those findings. Furthermore, Rutgers University has documented that rolling and increasing the height of cut decreases anthracnose, and MSU has reported decreases in brown patch.

5. Decreased cutworm activity - maybe!*

OK. This might be a stretch, but bear with me and, if nothing else, you'll learn I am an honest individual. At the Hancock Turfgrass Research Center at Michigan State, we usually do not get enough black

about the author

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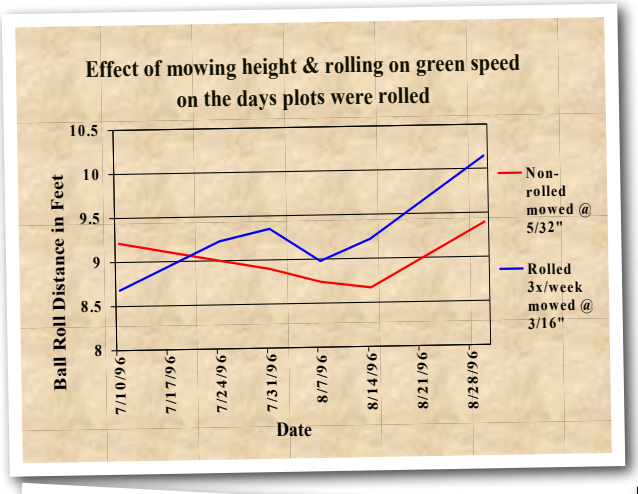
He is also the author of the book, The Superintendents Guide to Controlling Putting Green Speed.

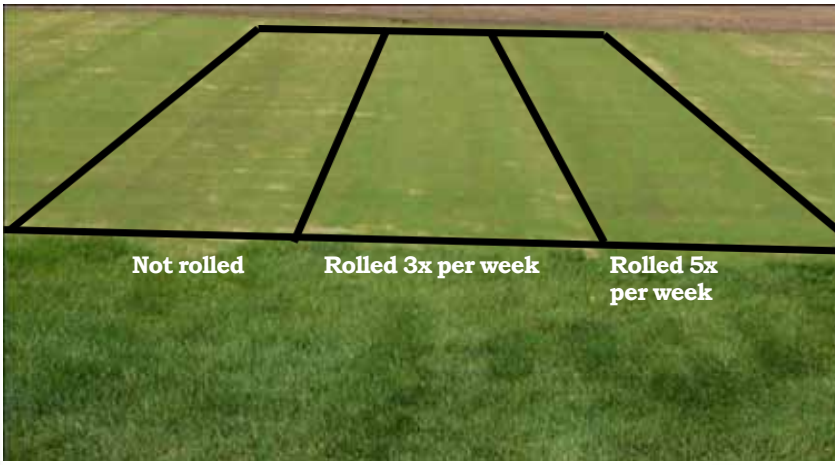
BELOW RIGHT (TOP): Seeded plots. The plot in the middle is rolled 3x per week to its left never rolled and to the right rolled 5X per day during establishment after seeding

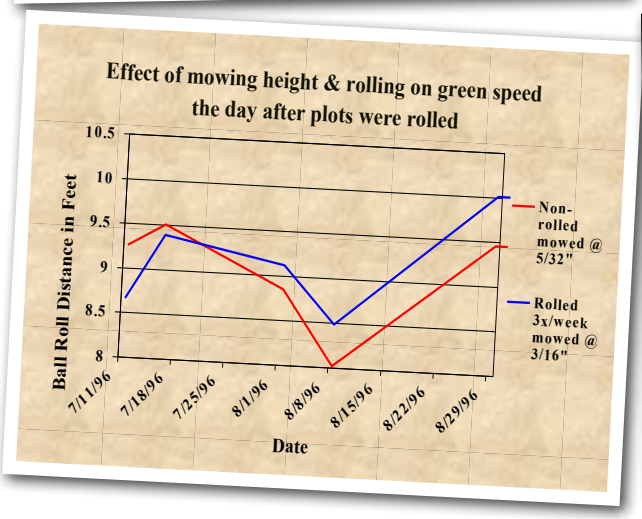
BELOW RIGHT (BOTTOM): Plot on left has never been rolled the plot on the right is rolled 3X/week

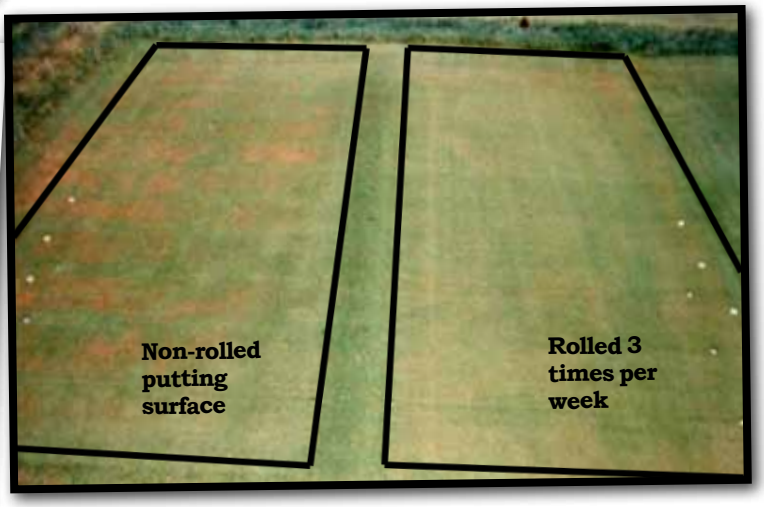
BELOW LEFT: Figure 1

MAIN IMAGE LEFT: Courtesy of Mike Morris CGCS









cutworms to warrant an insecticide spray.

However, over a period of years I had observed cutworms, along with their unmistakable chewing damage, on my plots, and both of these coincided with increased bird feeding. Therefore, I hypothesised that the birds were going after the cutworms.

The three years this happened I counted bird-beak holes in the turfgrass before mowing/rolling. Plots rolled three times per week had significantly fewer bird-beak holes (and therefore fewer cutworms). Interestingly enough, the decrease in bird beak holes was 55%-60% in each of the years, which seems pretty consistent.

I now feel comfortable stating that I think rolling decreases cutworm activity, but in all truth I did not count cutworms, so I cannot say it with 100% confidence. I'll leave that up to you until a turfgrass entomologist performs a more conclusive study.

**Further research is required into how this relates to the UK & European model, however rolling is a recognised method of disposing of chafer grubs.*

4. Improved topdressing incorporation

In 2006 MSU performed a lightweight roller/sand incorporation study on creeping bentgrass putting green plots. Treatments included control plots that were never topdressed with sand, topdressed plots with the sand brushed in when dry, and plots that were brushed and then received a single pass with the True-Surface vibratory roller.

The day after topdressing, the plots were mowed with a walk-behind mower with buckets intact. Approximately 40% less topdressing sand was collected in the buckets when plots were rolled after brushing (Figure 2).

These plots also had a faster green speed several days after topdressing and decreased organic matter content at the end of the season. To my knowledge, no university research study has tested whether non-vibratory rollers increase sand incorporation after topdressing.

3. Decreased dollar spot

In 1995 I noticed that research greens rolled three times per week had less dollar spot than greens that were not rolled. None of the data was statistically significant, and I was certain I would never make a similar observation. The following year, the rolled plots on my research greens had significantly less disease each time a dollar spot outbreak occurred. To say I was surprised would be an understatement. Since then I have made similar observations year after year in my lightweight rolling studies.

Additionally, in 2011 Paul Giordano, a Michigan State graduate, reported that increasing the frequency of rolling significantly decreased the incidence of dollar spot. The obvious question is, "Why does rolling decrease dollar spot?" The answer is lengthy and a bit elusive, and heck, this is just a top ten list. The important fact is that regular use of lightweight rolling does decrease dollar spot.

2. It's the economy (rolling/mowing frequency programs)

I published the results of my dollar spot observations in a scientific journal in 2001, and understandably many of my peers seemed sceptical.

In 2002, I gave a presentation on the subject at the GCSAA Education Conference in Orlando and several roller companies were so delighted that they have continued to fund my lightweight rolling research to date. Support from those companies (and the Michigan Turfgrass Foundation) has allowed us to study the effects of various rolling/mowing frequency programs over the years including the three listed below.

Alternating daily mowing and rolling.

In 2004 Michigan State initiated the first mowing/rolling frequency study by comparing mowing every day with alternating mowing and rolling on a daily basis.

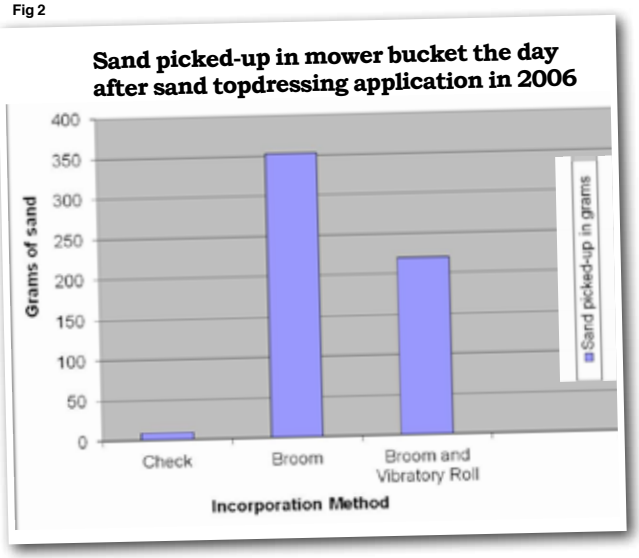
On research greens, alternating mowing and rolling improves turfgrass wear tolerance and produces green speed measurements equivalent to mowing daily. If you are thinking this might result in an economic saving, you are correct.

University of Tennessee graduate Dan Strunk performed a cost-analysis study comparing daily mowing to alternating mowing and rolling on a daily basis and concluded that alternating mowing and rolling could save the average golf course in Tennessee approximately $13,000 annually.

This can be a very nice economic option especially when heat stress is high on cool-season grasses or cold stress is high on warm-season grasses.

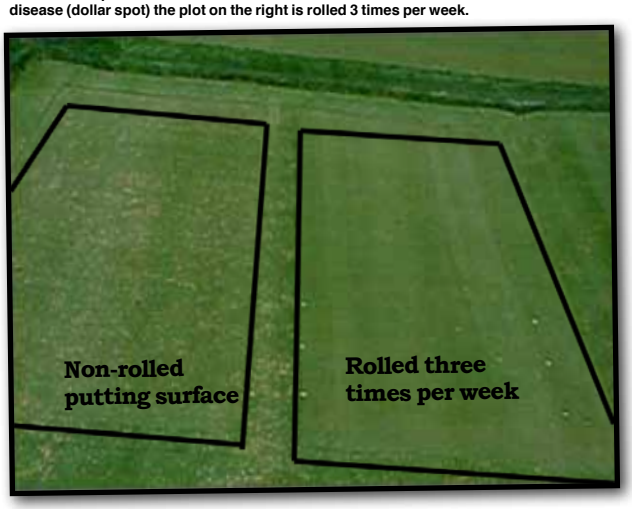
Courtesy of Mike Morris CGCS

Fig 2



"Lightweight rolling produces smoother putting surfaces, which result in truer ball roll and faster green speeds"

BELOW: The plot on the left has never been rolled and has a lot of disease (dollar spot) the plot on the right is rolled 3 times per week.



Mow and roll every day.

We certainly are not considering saving money with this option, however, results indicate that both mowing and rolling every day produces consistent green speeds from day to day, possibly allows raised mowing heights for better turfgrass health and wear tolerance, and results in significantly more dollar spot control than mowing every day and rolling every other day.

Roll every day and mow every other.

That's right, rolling every day and mowing every other day. When I initiated a study to exam this method a lot of individuals scoffed.

However, of all the mowing/rolling frequencies I have researched, this one results in the most consistent green speeds from day to day, very good wear tolerance compared to mowing alone, and better dollar spot control than mowing every day and rolling every other day.

Obviously, this program can result in some economic savings as well.

With all the programs listed above I have never observed an increase in compaction, however, all my research plots have been on frequent sand-topdressing programs (every two to three weeks).

An additional caution: when I rolled plots every day of the week, I always used the lightest rollers available on the market (that is, TruTurf, DMI Speed Roller and True Surface vibratory rollers) because they have been continuous supporters of my research.

I don't want to imply that rolling seven days per week with a roller heavier than 550 pounds would cause compaction and therefore weaker turf, I am just cautioning that we do not know whether heavier rollers used daily would result in compaction or not.

Although I am a big advocate of lightweight rolling and encourage every superintendent to roll greens, I am an even a bigger advocate of proceeding with caution when making any changes to a putting surface management.

1. Increased customer satisfaction

Golfer survey after golfer survey indicates that the condition of the putting surface is the number one thing golfers care about.

Lightweight rolling produces smoother putting surfaces, which result in truer ball roll and faster green speeds.

No other cultural or mechanical practice can increase customer satisfaction as much as frequent use of a lightweight roller.

Finally, no other mechanical practice allows the superintendent the possibility to adjust the green speed to make his clientele happy.

To quote Walter S. Harbin from 1922: "I cannot conceive how a perfect putting surface can be developed or maintained without rolling." I think Mr Harbin would be happy with the current use of the practice today.