

## **2003 MICHIGAN TURFGRASS FOUNDATION FUNDED RESEARCH REPORT**

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Dedicated lightweight rollers come in a variety of shapes, sizes, and weights. The only common similarity between many of them is they are manufactured with the intended purpose of rolling golf course greens.

In 2002 MSU initiated a lightweight green rolling study to determine if there were any differences in green speed or soil physical properties caused by different types of rollers that are currently on the market. The study was initiated on a 'Providence' creeping bentgrass green mowed six days per week at 0.125" with a Toro walk behind mower. The root-zone corresponded to USGA-construction methods and the site was sand-top dressed every two weeks for the duration of the study. Nitrogen inputs were minimal with the plots receiving 0.10 lbs N per 1000 sq. ft. foliar application every two weeks during the season.

There were five different rollers utilized in the study representing the main types of lightweight rollers on the market. Lightweight rollers included in the study were the True-Surface Vibratory Roller and four sidewinder units that included The Salsco and Smithco units each having two rollers, the DMI Speed Roller with three rollers, and the Tru-Turf Slice and Roll which has four rollers. Also included in the study were a non-rolled check plot that that was mowed six days per week and another non-rolled plot that was double cut six days per week.

For the first two-weeks of the study Stimpmeter measurements were obtained from the plots nearly every day. On the day plots were rolled every lightweight roller noticeably and significantly increased green speed compared to the non-rolled check plot. However, the day after rolling there were no differences in green speed between any of the rolling treatments and the non-rolled plots. Perplexed by the results we searched for a possible cause for the lack of residual green speed and discovered an excessive amount of thatch (over 1-inch thick) underlying the studies "Providence" bentgrass turf.

Obviously, the sponginess caused by an excessive thatch layer could have an effect on residual green speed attributed to lightweight rolling. Therefore, the site was put on an aggressive thatch reduction program and as the thatch diminished (over several months) the residual green speed attributed to lightweight rolling increased. Granted, on the MSU plots there was 1-inch of thatch, which would be extremely excessive on an actual golf course putting green. As the thatch was reduced to approximately    inch thick the residual green speed attributed to lightweight rolling lasted for two days.

In Table 9-1 are the annual average increases in green speed attributed to the different rollers and double cutting on the day plots were rolled and the day following the rolling treatment. Lower case letters are included to indicate statistical significance. The average increase followed by the same lower case letter in each column is not significantly different (that is they are considered to be equal). These lower case letters have no meaning going from left to right in the table, but are only meaningful in each column.

Table 1

| Annual average increases in green speed in inches attributed to various lightweight rollers and double cutting compared to a daily mowed check on 'Providence' creeping bentgrass plots on the day of and the day following lightweight rolling treatments at the Hancock Turfgrass Research Center East Lansing, MI 2002-2003. |       |                       |                |                      |                |
|---|-------|-----------------------|----------------|----------------------|----------------|
| Treatment   |       | 2002 Season Averages* |                | 2003 Season Averages |                |
|   |       | Day Rolled            | Day After Roll | Day Rolled           | Day After Roll |
| Check   | Daily | e                     | d              | e                    | c              |
| Double Cut  | Daily | 10" d                 | 8" a           | 11" d                | 12" a          |
| Speed Roller  | EOD   | 20" a                 | 7" ab          | 20" a                | 9" b           |
| Salsco  | EOD   | 15" bc                | 5" abc         | 16" ab               | 10" ab         |
| Slice & Roll  | EOD   | 17" ab                | 4" bc          | 16" ab               | 8" b           |
| True-Surface  | EOD   | 14" c                 | 3" c           | 13" cd               | 7" b           |
| Smithco   | EOD   | 16" bc                | 6" ab          | 15" bc               | 9" b           |
| Significance  |       | ***                   | ***            | ***                  | ***            |

All plots were mowed six days per week at a 0.125 cutting height.

EOD plots were rolled every other day, thus 3 days one week followed by 4 days the next.

\* Season averages are based upon weekly green speed measurements obtained on the day of and the day after rolling treatments were applied from June thru August

\*\*\* Significant 0.001. Means in columns followed by the same letter are not significantly different at the 5% level using the means separation test.

Comparing the season averages of 2002 to 2003 on the day plots were rolled notice that every rolling treatment varied by no more than 1-inch. To clarify, notice that the Speed Roller increased green speed 20" on the day plots were rolled in 2002 and 2003 and similarly the True-Surface Vibratory Roller increased green speed by 14" in 2002 and 13" in 2003. Clearly both are noticeable accelerations in green speed.

The day following the rolling treatment all the lightweight rollers included in the study significantly increased green speed in both 2002 and 2003 compared to the check plot. However, while all the data was statistically significant in 2002 only the Speed Roller and the Smithco roller averaged an increase in green speed that could possibly be detected by the average golfer. As mentioned earlier the lack of residual green speed in 2002 was attributed to a 1-inch thatch layer. As the thatch thickness was reduced to    inch all rolling treatments resulted in meaningful increases in green speed the day after rolling in 2003. In short, all rollers included in the study increased green speed by over a foot on the day rolling was applied and retained over 6-inches of that increase the day after rolling once the thatch was brought under control.

The rule of thumb that superintendents can expect an average increase in green speed of 1-foot on the day greens are rolled is blown away by the results of this study as some of the rollers resulted in an average increase in green speed closer to 1.5 feet. However, the differences between the green speeds the rollers generate may not be as great as they appear. Investigating the extremes the Speed Roller resulted in the fastest green speed both years on the day plots were rolled while the True Surface averaged the lowest increase in green speed of all the rollers in the study. In 2002 there was a 6" difference between those two treatments and in 2003 and average of a 7" difference. Given that all the other lightweight rollers resulted in green speed increases between these two extremes it implies there is little meaningful difference between the roller types and the impact they have on green speed.

Additionally, the day following the rolling treatments in 2003 (when thatch thickness was reduced) there was only a 3” difference in green speed among the rolling treatments. Another point worthy of consideration should be variability in green speed from day to day. From the data generated it appears that rollers that create the quickest green speeds on the day they roll also result in the biggest drop-off in speeds the following day. It is important to once again point-out that in this particular study the difference in green speed from day to day could possibly have been exacerbated by the excessive amount of thatch on the research green plots. Other considerations that should be taken into account prior to purchasing a lightweight roller include topography of green surrounds and contours, staffing, budget, ease of operation, maintenance, transport from green to green, and other possible uses for the roller.

Double cutting six days per week was included in the study to compare and contrast the differences in the two cultural practices and the impact each had on green speed and the turf. While there were clearly differences in green speed between double cutting and lightweight rolling it is easiest to conclude that both cultural practices increased green speed significantly and meaningfully. The biggest take home message is lightweight rolling every other day results in similar green speed increases as double cutting everyday. The point is lightweight rolling every other day is less labor intensive than double cutting every day and less wear and hours are required on the mower if a lightweight rolling program is followed in place of double cut every day.

I have been questioned about the potential of rolling every other day and double cutting on the off days to maintain a fast consistent green speed. Clearly, the data generated from this study makes that an intriguing question. However, we could only speculate at this time (but that treatment will be included in a study to be initiated this summer).

It is noteworthy that the double cut plots originally resulted in the lowest turfgrass quality due to scalping that apparently was exacerbated during the second pass when there was a great deal of thatch on the plots. However, the scalping diminished as the thatch thickness decreased and afterwards double cutting resulted in no reduction in turfgrass quality during the second year of the study. In all none of the treatments resulted in a decrease in turfgrass color, quality, bulk density (soil compaction), or water infiltration compared to the non-rolled single-mowed check plot.

Superintendents are currently displaying a lot of imagination in the variety of ways they utilize their lightweight rollers. Some courses raise their mowing heights in the heat of the summer and roll every other day to maintain green speeds produced by the lower cutting. Other courses roll everyday just prior to and during the club championship and/or important golf outings to exacerbate green speed and some superintendents roll (usually with vibratory rollers) following a sand topdressing application to help work in the sand. No matter how they are being used one thing seems certain, more and more superintendents are using lightweight rollers.

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