

2002 MICHIGAN TURFGRASS FOUNDATION FUNDED RESEARCH REPORT
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Lightweight Green Rolling

Introduction

During the past eight years Michigan State University (MSU) has performed several lightweight green rolling studies. Among the conclusions is lightweight rolling up to three times per on greens on a light frequent sand topdressing program results in more benefits than detriment to the putting surface. Benefits from previous studies include:

- 1) No significant decrease in turfgrass color or quality
- 2) Increased green speed averaging 1-foot on the day plots were rolled
- 3) Increased green speed averaging 6- inches the day after plots were rolled
- 4) Reduced dollar spot severity.
- 5) Increased root growth in the sand topdressing layer
- 6) Less localized dry spot and
- 7) Fewer broadleaf weeds

The conclusions from these studies have certainly played a part in the increased use of rollers on golf courses. However, most of the lightweight roller research performed at MSU was performed with an Olathe roller that weighed approximately 950 lbs. Most rollers on the market today weight hundreds of pounds less. Furthermore, our studies have indicated that roller weight may not be as significant as roller type.

The question that continues to be asked by superintendents is, “What difference, if any, are there among the different styles of lightweight rollers”? In other words, should superintendents expect the same increases in green speed and the aforementioned benefits with the lighter rollers on the market today? To address this question the MTF has funded a two-year study to address turfgrass color and quality, water infiltration, green speed, and other surface characteristics on plots rolled with different roller types.

Materials & Methods

The study was initiated on 2 June 2002 on a Providence creeping bentgrass green that was mowed at a .120-inch cutting height. Other cultural practices on the site included mowing seven days per week, foliar fertilization at 1/10 pound of N/ 1000 sq. ft. every two weeks, and sand-topdressing and verticutting also took place on a bi-weekly basis.

Early Stimpmeter measurements resulted in a lot of variability among the same treatment on different plots (replications). Past experience with the Stimpmeter and rolling treatments often results in statistically significant data of measurements of 3-inches. In an attempt to understand

why so much variability was observed on the plots a soil probe was inserted into the plots and it was discovered the plots had 1-inch of thatch. Certainly, this is an excessive amount of thatch for a golf course putting green. To assist in the alleviation of the problem a Graden was used on all plots on 19 June. The use of the Graden and the other cultural practices (topdressing & verticutting) resulted in a thatch layer of ½ inch at the end of the season.

Treatments included a check (non-rolled), double cut 7 days /week (not rolled), and five lightweight rollers that are currently on the market. These rollers included two sidewinders with three rollers (the DMI Speedroller and the Tru-Turf Roll “n” Slice), two sidewinders with two rollers (the Smithco Tournament Roller and the Salsco roller), and a triplex attachment roller (the Tru-Surface vibratory roller) on a John Deere Triplex mower. Rolling treatments were applied every other day from 2 June to 24 August. Thus, plots were rolled 3 days one week and 4 days the next. There were three replications of each treatment.

Data collection included Stimpmeter measurements obtained on the day of and day after rolling. Measurements were obtained in accordance with United States Golf Association standards. Several color and quality ratings were taken but are not reported in this paper since no meaningful data resulted. On 24 August field infiltration measurements were obtained.

Results & Discussion (from year one)

Green speed measurements obtained with a Stimpmeter are presented in Tables 1a and 1b. All twelve dates Stimpmeter measurements were taken resulted in statistically significant data. With the exception of the True-Surface vibratory roller on 4 June (2 days after study initiation) all rollers resulted in significantly faster green speeds than the non-rolled check plot. On three occasions (4, 6, and 12 June) there were no significant differences between the single mow and double mow treatments.

Season averages indicate all rolling treatments increased green speed more than a foot compared to the non-rolled check plot. The True Surface Vibratory roller averaged 1’2” faster than the check and the Speed Roller averaged 1’8” faster than the check plot with other rolling treatments averaging in between these two extremes. Double cutting seven days a week resulted in an average increase of 10-inches as compared to the check plot.

| Treatment | Frequency* | 2 June | 4 June | 6 June | 8 June | 12 June | 18 June | 2 July |
|--------------|------------|---------|----------|----------|----------|----------|----------|----------|
| Check | Daily | 8.55 c | 9.00 c | 9.09 c | 8.61 d | 8.84 d | 9.39 c | 9.75 c |
| Double Cut | Daily | 9.33 b | 9.61 bc | 9.62 bc | 9.39 c | 9.19 cd | 10.00 b | 10.66 b |
| Speed Roller | EOD | 9.71 ab | 10.68 a | 10.68 a | 10.23 a | 10.07 a | 10.92 a | 11.67 a |
| Salsco | EOD | 9.90 a | 9.85 b | 10.12 ab | 9.75 abc | 9.67 abc | 10.52 a | 10.81 b |
| Slice & Roll | EOD | 9.93 a | 10.11 ab | 10.70 a | 9.94 ab | 10.00 ab | 10.68 a | 11.22 ab |
| True-Surface | EOD | 9.38 b | 9.69 bc | 10.27 a | 9.52 bc | 9.48 c | 10.46 ab | 10.81 b |
| Smithco | EOD | 9.60 ab | 10.03 ab | 10.14 ab | 9.83 abc | 9.57 bc | 10.71 a | 11.69 a |
| Significance | | *** | ** | *** | *** | ** | *** | *** |

All plots were mowed seven days per week at a .120 cutting height. EOD plots were rolled every other day, thus 3 days one week followed by 4 days the next.

, * Significant at 0.01 and 0.001, respectively. Means in columns followed by the same letter are not significantly different at the 5% level using the means separation test.

| Treatment | Frequency* | 10 July | 16 July | 30 July | 7 Aug. | 15 Aug. | Season Average |
|--------------|------------|----------|-----------|----------|---------|----------|----------------|
| Check | Daily | 9.64 c | 9.79 d | 8.87 d | 9.81 b | 9.86 c | 9.27 e |
| Double Cut | Daily | 10.99 b | 10.49 cd | 9.54 c | 11.18 a | 10.93 b | 10.08 d |
| Speed Roller | EOD | 11.39 ab | 11.73 a | 10.28 ab | 12.23 a | 11.42 a | 10.92 a |
| Salsco | EOD | 11.67 a | 11.15 abc | 10.37 a | 11.66 a | 11.08 ab | 10.55 bc |
| Slice & Roll | EOD | 11.66 a | 11.19 abc | 10.32 ab | 11.20 a | 11.30 a | 10.69 ab |
| True-Surface | EOD | 10.95 b | 10.90 bc | 10.43 a | 11.93 a | 11.08 ab | 10.41 c |
| Smithco | EOD | 11.37 ab | 11.44 ab | 9.88 bc | 11.70 a | 11.27 ab | 10.60 bc |
| Significance | | *** | *** | *** | ** | *** | *** |

All plots were mowed seven days per week at a .120 cutting height. EOD plots were rolled every other day, thus 3 days one week followed by 4 days the next.

, * Significant at 0.01 and 0.001, respectively. Means in columns followed by the same letter are not significantly different at the 5% level using the means separation test.

Stimpmeter measurements obtained the day after plots were rolled are presented in Tables 2a and 2b. Only three of the twelve dates resulted in statistically significant data (excluding the season average). Past MSU research has resulted in an average difference of 6- inches in green speed remaining the day after plots are rolled compared to non-rolled plots. This 6-inch difference is significant because numerous surveys have indicated that the majority of golfers cannot detect a difference in green speed when plots differ by less than 6 inches. However, note that statistically significant data resulted in three of the last four occasions that Stimpmeter data was collected. It is possible that the excessive thatch layer that was discussed earlier had an impact on the residual green speed. Furthermore, note that even though the majority of the data is not statistically significant most of the rollers still obtained a season average of 6-inches greater than the non-rolled check plot the day after rolling. Additionally, note that there is no meaningful difference (> 6") among green speeds of plots that were double cut seven days per week and the rolled plots the day after rolling occurred.

| Treatment | Frequency* | 5 June | 7 June | 9 June | 11 June | 19 June | 25 June | 3 July |
|--------------|------------|--------|--------|--------|---------|---------|---------|--------|
| Check | Daily | 8.76 | 8.92 | 8.43 | 8.89 | 9.64 | 8.62 | 9.32 |
| Double Cut | Daily | 8.02 | 9.03 | 9.03 | 9.10 | 9.82 | 9.40 | 10.33 |
| Speed Roller | EOD | 9.01 | 9.49 | 8.74 | 8.99 | 10.33 | 9.19 | 9.76 |
| Salsco | EOD | 8.96 | 9.34 | 8.97 | 8.91 | 9.85 | 8.94 | 9.79 |
| Slice & Roll | EOD | 9.05 | 9.34 | 8.75 | 9.28 | 9.95 | 9.01 | 9.92 |
| True-Surface | EOD | 8.71 | 9.31 | 8.50 | 9.06 | 9.84 | 8.53 | 9.50 |
| Smithco | EOD | 9.19 | 9.37 | 8.97 | 9.25 | 10.03 | 8.93 | 9.75 |
| Significance | | NS | NS | NS | NS | NS | NS | NS |

All plots were mowed seven days per week at a .120 cutting height. EOD plots were rolled every other day, thus 3 days one week followed by 4 days the next.

, * Significant at 0.01 and 0.001, respectively. Means in columns followed by the same letter are not significantly different at the 5% level using the means separation test.

NS Not statistically significant.

| Treatment | Frequency* | 9 July | 17 July | 31 July | 8 Aug. | 16 Aug. | Season Average |
|--------------|------------|--------|----------|---------|----------|----------|----------------|
| Check | Daily | 9.34 | 9.99c | 9.28 | 10.25 c | 9.82 c | 9.27 d |
| Double Cut | Daily | 9.81 | 10.93 ab | 10.03 | 11.76 a | 11.07 a | 9.94 a |
| Speed Roller | EOD | 9.88 | 10.99 a | 9.78 | 11.20 ab | 10.63 ab | 9.83 ab |
| Salsco | EOD | 9.84 | 10.84 ab | 9.71 | 11.53 ab | 10.17 bc | 9.74 abc |
| Slice & Roll | EOD | 9.78 | 10.63 ab | 9.77 | 10.98 bc | 10.14 bc | 9.72 bc |
| True-Surface | EOD | 9.45 | 10.52 b | 9.92 | 10.80 bc | 10.22 bc | 9.53 c |
| Smithco | EOD | 9.73 | 10.86 ab | 9.69 | 11.29 ab | 10.59 ab | 9.80 ab |
| Significance | | NS | *** | NS | ** | ** | *** |

All plots were mowed seven days per week at a .120 cutting height. EOD plots were rolled every other day, thus 3 days one week followed by 4 days the next.

** , *** Significant at 0.01 and 0.001, respectively. Means in columns followed by the same letter are not significantly different at the 5% level using the means separation test.

NS Not statistically significant.

In Table 3 water infiltration data that was obtained at the conclusion of the study in year one of this two-year study. Past research at MSU has never resulted in statistically significant reduction in water infiltration into plots rolled three days a week as compared to non-rolled plots.

Considering that these plots were rolled every other day at a tighter cutting height it was possible that these rolled plots might have resulted in reduced infiltration rates. However, year one produced no significant data. Interestingly, plots that were double cut seven days per week resulted in the lowest water infiltration. It is possible that the excessive thatch layer had an impact on these results and further thatch reduction may yield statistically significant data in 2003.

| Treatment | Frequency* | 24 August 20002 |
|--------------|------------|-----------------|
| Check | Daily | 18.6 |
| Double Cut | Daily | 10.1 |
| Speed Roller | EOD | 14.7 |
| Salsco | EOD | 15.2 |
| Slice & Roll | EOD | 16.6 |
| True-Surface | EOD | 16.4 |
| Smithco | EOD | 18.8 |
| Significance | | NS |

* All plots were mowed seven days per week at a .120 cutting height. EOD plots were rolled every other day, thus 3 days one week followed by 4 days the next.

NS Not statistically significant.

Conclusions (*from year one*)

Data from year one indicates that the lightweight rollers in the study significantly increased green speed on the day the greens were rolled. The residual response is uncertain and this was attributed to the thatch layer being excessive (especially during the earlier portions of the experiment). Depending upon the results from next year we will be better prepared to hypothesis if the thatch had an impact on the residual green speed.

No decrease in color or quality was observed with any of the rolling treatment. Additionally, field infiltration measurements resulted in no negative effects of rolling every other day. I would like to thank the MTF, all five roller companies, and Weingarts for their iron and financial support.