

## SOME PRETTY COOL THINGS ABOUT LIGHT WEIGHT GREEN ROLLING

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Light weight rolling of greens has become a popular practice in just a few years. This is attributed to the fact that the benefits of rolling include increased green speeds and true putting surfaces. However, many questions are still unanswered regarding light weight green rolling.

In the summer of 1992, three replications of three putting green construction types were randomly assigned and seeded with 'Penncross' creeping bentgrass. The objective of the design was to identify differences that occur among three common soil types found in Michigan greens. The three soils include: 1) an 80% sand, 20% peat green built to U.S.G.A. rootzone specifications; 2) an 80% sand, 10% peat, 10% soil green mix with subsurface drainage; and 3) a native sandy clay loam green. Each soil block measures 40 feet by 40 feet with four Rain Bird Maxi Paw heads on the corners for individual plot irrigation. There are three replications of each soil block.

The light weight green rolling study was initiated in 1995 at the Hancock Turfgrass Research Center. Each soil type plot was split into two 34 foot by 17 foot greens that were mowed at a 5/32 inch cutting height six times per week with a walk behind mower. A three foot collar separated each green and was mowed three times per week at a 3/8 inch cutting height. One green from each plot was randomly selected and rolled three times per week with an Olathe roller from 20 May through 30 September, 1996 where the other green in the same soil block was not rolled. All data reported in this paper reflect the impact of light weight green rolling across the three different soil types.

In 1995 this study was supported by the Michigan Turfgrass Foundation. In 1996 the United States Golf Association provided additional funding for this project. This additional funding will permit evaluation of results in greater detail and will permit the study to continue for a longer duration. This is important because many research studies on cultural practices are short term while golf course superintendents must continue their practices for longer periods.

Table 1 reflects the average gain in green speed that light weight green rolling produced over non-rolled greens. Data was collected with a Stimpmeter on the average of three hours after rolling. Most data in Table 1 is consistent with findings from other light weight green rolling studies. Light weight green rolling, after mowing, increases green speed approximately one foot on the day of rolling and a residual effect remains the day after rolling. The most significant finding regarding green speed was obtained from the roll then mow data. From talking with golf course managers and MSU students who return from internships, we know that many greens are rolled than mowed. From this scenario we observe a substantial decrease in the potential green speed gain that mowing than rolling produce.

**Table 1.**

**Season Averages: Net gains in ball roll attributed to light weight green rolling in inches. Averages reflect data compiled over three putting green construction types on the day they were rolled.**

Year	1995	1996
Day mowed then rolled	12.0 *	11.6 *
30+ Hours after mow then roll	5.5 **	7.3 **
50+ Hours after mow then roll	3.5 **	4.4 **
Rolled then mowed	7.3 **	6.5 **

\* Averages compiled from ten Stimpmeter events during the season.

\*\* Averages compiled from four Stimpmeter events during the season.

Color and quality ratings appear in Tables 2 and 3, respectively. The number nine is assigned to

superior color and quality, six and above is considered acceptable for a putting surface, and the number one signifies dead grass. Data given are averaged across the three putting green construction types as no statistical significance occurred among soils. Though rarely statistically significant, rolling appears to have decreased color and quality marginally. However, in all cases color and quality ratings achieved acceptable ratings. Though no statistical significance occurred it is noteworthy that the 80:10:10 mix suffered the largest decrease in color and quality after 14 weeks of rolling. It is our assumption that the decrease can be overcome with other cultural practices such as coring, HydroJect treatments, iron applications, foliar nitrogen treatments, and irrigation.

**Table 2.**

**Light Weight Green Rolling Study On Three Putting Green Construction Types. Color Ratings 1996**  
9 = excellent, 6 = acceptable for a putting green, 1 = dead turf.

	June 12	July 4	August 16	September 6
Rolled 3x/week	7.1	7.0	6.8	6.7
Not Rolled	7.6	6.7	7.1	7.3
Significance @ .05	n.s.	n.s.	.03	.01

**Table 3.**

**Light Weight Green Rolling Study On Three Putting Green Construction Types. Quality Ratings 1996**  
9 = excellent, 6 = acceptable for a putting green, 1 = dead turf.

	June 12	July 4	August 16	September 6
Rolled 3x/week	6.2	6.4	6.7	6.7
Not Rolled	6.3	6.3	6.9	7.0
Significance @ .05	n.s.	n.s.	n.s.	n.s.

Dollar spot data was collected in 1995 and 1996. In 1995 (Table 4) the difference in dollar spot activity between rolled and unrolled plots increased as the year progressed. In 1996 (Table 5) dollar spot activity was statistically significant on most dates. Rolled plots had far less dollar spot than did the unrolled plots.

**Table 4.**

**Light Weight Green Rolling Study On Three Putting Green Construction Types.**  
Dollar spot counts averaged across all construction types 1995.

	June 7	July 27	August 15	September 1
Rolled 3x/week	22	226	50	201
Not Rolled	23	254	83	363

**Table 5.**

**Light Weight Green Rolling Study On Three Putting Green Construction Types.**  
Dollar spot counts averaged across all construction types 1996.

	June 14	June 24	August 2	August 7
Rolled 3x/week	8	35	9	53
Not Rolled	20	79	27	188
Probability @ .05	.01	.03	n.s.	.02

Table 6 reports other surface observations attributed to light weight green rolling in 1996. Pink snow mold increased on the plots that received light weight green rolling. This disease data leads us to wonder if this

response would have occurred had we postponed light weight green rolling until pink snow mold season passed. From the 1995 and 1996 dollar spot data we conclude that a long term effect of light weight green rolling impacts that disease in a positive manner. Thus it is fair to assume, but not to conclude, that the light weight green rolling treatments of 1995 may have contributed to increased pink snow mold activity in the spring of 1996 even if rolling had been suspended until pink snow mold activity had ceased. The cause of these differences will continue to be investigated.

Moss data was collected on June 7, 1996. Data reflects the average of two persons counting moss growth. A count of one was given to moss growth that covered the surface area of an American dime. The data shows a significant decrease of moss growth on the greens rolled three times per week. Bird activity data was collected when cutworm activity was high at the Hancock Turfgrass Research Center. Each count in the table represents one hole caused by birds. This data may suggest the amount of cutworm activity in each green or it may suggest that the birds feed where the soil is less firm. Further research along this line is necessary to draw any conclusions, but the numbers are intriguing. In 1997 cutworm counts will be taken to further substantiate if light weight green rolling can indeed decrease cutworm activity.

**Table 6.**  
**Light Weight Green Rolling Study On Three Putting Green Construction Types.**  
**Surface Observations 1996**

	Pink Snow Mold June 5, 1996	Moss Counts June 7, 1996	Bird Peckings August 5, 1996
Rolled 3x/week	244	3	135
Not Rolled	149	19	306
Significance @ .05	.05	.03	.00

Five soil cores were taken from each plot on July 11, 1996. Each core was obtained by hammering a 7.62 cm diameter ring that was 7.62 cm high into each plot. Afterwards each core was dug from the soil and the thatch layer was removed. In Table 7 soil physical properties are reported. Data includes bulk density, total porosity and porosities at .04, .1, and .33 bar. The bulk density of a soil core is determined by dividing the mass of the core by the volume of the core. Changes in bulk density are used to determine changes in the soil compaction due to traffic. Total soil porosity provides an estimate for the potential of gas, nutrient, and water movement through the soil. Porosity is a useful way to characterize a soil for plant growth. Note that no statistically significant differences occur between rolled and non-rolled plots regarding bulk density or total porosity. However, at .04 bar the rolled U.S.G.A. and 80:10:10 greens have statistically significantly less macropores than their non-rolled counterparts, and that the 80:10:10 mix has less porosity at .1- and .33 bars. These changes imply a decrease in the amount of macropores in these two soils. However, since the total porosity is unchanged then more micropores are present in these soils when light weight green rolling was applied. Micropores have a greater water holding capacity than macropores which explains the fact that less localized dry spot was observed on the rolled plots.

**Table 7.**  
**Light Weight Green Rolling Study On Three Putting Green Construction Types.**  
**Soil Physical Properties July 11, 1996**

	Bulk Density	Porosity			
		0.04 bar	0.1 bar	0.33 bar	Total
USGA Rolled	1.57	20.7 b	24.7 a	26.0 a	40.7
USGA Check	1.54	23.0 a	27.0 a	28.0 a	41.0
80:10:10 Rolled	1.62	11.0 d	14.7 c	17.3 c	38.0
80:10:10 Check	1.57	14.3 c	19.0 b	21.7 b	38.3
Native Rolled	1.72	6.7 e	8.7 d	10.7 d	36.3
Native Check	1.71	5.3 e	7.0 d	8.3 d	36.3
significance @ .05	n.s.	.03	.03	.01	n.s.
LSD		2.3	2.8	2.7	

Means in columns followed by the same letter are not significantly different at the 5% level using the LSD mean separation test.

Another light-weight green rolling study took place at Michigan State in the summer of 1996. The

study was on a seven year mature "PennLinks" green constructed with an 80% sand :20% peat soil mix. Treatments in the study included:

1. rolled 3x/week with an Olathe roller maintained at a 5/32" cutting height;
2. rolled 3x/week with an Jacobsen triples roller maintained at a 5/32" cutting height;
3. double cut 5x/ week at 5/32" height of cut;
4. rolled 5x/week with an Jacobsen triples roller maintained at a 5/32" cutting height;
5. rolled 3x/week with an Jacobsen triples roller maintained at a 3/16" cutting height;
6. a check plot maintained at a 5/32" cutting height.

In Table 8 are Stimpmeter data from the day all green rolling treatments were applied. Table 9 gives data from the day after rolling with the exception of treatment four which was rolled five days per week. Interesting comparisons from Tables 8 and 9 include comparing the 5/32" height of cut check plot vs. the 3/16" height of cut treatment that is rolled 3x/week. On July 10, two days after the study was initiated, the check plot mowed at 5/32" stimped six inches further than the 3/16" mowed plot that had been rolled. All data collection later in the study the 3/16" rolled plots produced statistically equal and in some cases, statistically faster speeds than the 5/32" check plots on the day of and the day after rolling. Stimp differences less than 0.5 feet may be statistically significant but are not considered to be large enough for most golfers to be able to detect. Thus, we conclude that rolling three times per week on greens mowed at 3/16 inches produces green speeds as fast as greens mowed at 5/32 inches that are not rolled. Another point of interest includes comparing rolling and double cutting. Season averages from the day off and the day after rolling demonstrates that double cutting five times per week produces negligible positive effects over rolling three times per week at 5/32".

**Table 8.**  
**Light Weight Green Rolling Study 1996 Stimp meter data collected on the day of rolling.**

Initiated July 8 Numbers are in feet.

Rolling Treatment	Cutting Height		July 10	July 24	July 31	Aug 7	Aug 14	Aug 30
Season Average								
3x/week Olathe 5/32	9.95 a	10.17 a	10.00 a	9.83 a	9.92 a	11.18 a	10.17 a	
3x/week Jacobsen	5/32	10.07 a	10.07 a	9.77 ab	9.69 a	9.42 ab	10.52 bc	9.93 a
Double cut 5x/week	5/32	9.44 bc	10.09 a	9.15 c	9.06 b	9.17 bc	10.48 bc	9.57 b
5x/week Jacobsen	5/32	9.72 ab	9.95 a	9.82 ab	9.7 a	9.32 abc	10.88 ab	9.90 a
3x/week Jacobsen	3/16	8.68 d	9.22 b	9.35 bc	8.98 b	9.22 bc	10.15 c	9.27 c
Check cut at 5/32	5/32	9.21 c	9.00 b	8.90 c	8.74 b	8.67 c	9.400 d	8.99 c
LSD @ .05	.45	.61	.50	.54	.66	.60	.30	

Means in columns followed by the same letter are not significantly different at the 5% level using the LSD mean separation test.

**Table 9.**

**Day After 3x/week Treatments were Rolled Stimp meter data collected the day after 3x/week treatments.** Initiated July 8 Numbers are in feet.

	Height of Cut	July 11	July 16	Aug 1	Aug 8	Aug 13	Aug 29	Season Average
3x/week Olathe	5/32	9.05 ab	9.97 ab	8.92 b	8.64 b	9.70 ab	10.43 b	9.45 b
3x/week Jacobsen	5/32	9.50 a	9.66 bc	8.9 b	8.18 cd	9.35 bc	9.79 c	9.23 c
Double cut 5x/week	5/32	9.39 a	9.95 ab	9.02 b	8.47 bcd	9.80 ab	10.08 c	9.45 b
5x/week Jacobsen	5/32	9.50 a	10.22 a	9.5 a	9.15 a	10.13 a	10.94 a	9.91 a
3x/week Jacobsen	3/16	8.66 b	9.39 c	9.12 ab	8.49 bc	9.35 bc	10.01 c	9.17 c
Check cut at 5/32	5/32	9.26 a	9.51 c	8.85 b	8.02 d	9.07 c	9.46 d	9.03 d
LSD @ .05	.55	.35	.39	.45	.49	.31	.18	

Means in columns followed by the same letter are not significantly different at the 5% level using the LSD mean separation test.

### Conclusions

Light weight green rolling 3x/week increases green speed approximately one foot on the day the greens are rolled. Light weight green rolling 3x/week significantly reduced dollar spot activity during the second season of green rolling.

Light weight green rolling 3x/week increased the occurrence of pink snow mold.

Light weight green rolling 3x/week decreased some color and quality ratings but decreased ratings were still acceptable.

Light weight green rolling 3x/week decreases the occurrence of moss growth.

Light weight green rolling 3x/week decreases the occurrence of localized dry spot.

Light weight green rolling 3x/week on greens mowed at a 3/16 inch cutting height produced greenspeeds equal to greens mowed at 5/32 inches on the day of and the day after rolling treatments.

Light weight green rolling 3x/week produced green speeds equal to or faster than double cutting 5x/week on the day of and the day after rolling treatments.

At 5/32 inch mowing height there was no difference in green speed attributed to roller type.