

## Evaluation of Fairway Rolling Frequency and Fungicide Programs for Dollar Spot Control

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**Introduction:** Dollar spot, caused by the ascomycete fungus *Sclerotinia homoeocarpa* (F.T. Bennett), is a major turfgrass disease causing significant damage to turfgrass swards from May to October on New England golf courses (Bennett, 1937; Smiley et al., 2005). Fungicide applications are made throughout the growing season and account for a significant portion of golf course fairway maintenance budgets. Reducing fairway fungicide applications can save substantial amounts of money and allow for resource allocation in other maintenance areas.

The practice of rolling has gained popularity on putting greens over the last 10-15 years for a variety of reasons (Nikolai, 2002). Rolling was originally initiated to improve greens speed and improve ball roll. In addition, recent studies have shown that rolling reduces dollar spot significantly (Giordano et al., 2012; Nikolai et al., 2001). While the improved playability aspects of rolling have always been known, the disease control benefits are a new area that deserves further research. Previous studies have shown that reductions in dollar spot can be as great as 50-60% from rolling in the morning or afternoon (Giordano et al., 2012). Giordano et al. (2012) also debunked the previous misconception that rolling reduced dollar spot severity due to dew removal in the morning. Thus, Giordano et al. demonstrated that an effective rolling program could be initiated at differing times of the day and still provide the same reduction in dollar spot. Moreover, multiple superintendents that have initiated fairway-rolling programs observed reduced dollar spot, reduced mowing and improved fairway conditions (Pioppi, 2014).

Aside from the disease reduction ramifications, there is little information regarding the potential deleterious effects of fairway rolling. Issues such as compaction, wear, and other unforeseen maladies may arise. Previous rolling studies on putting greens have shown that compaction did not increase in either rolled or non-rolled treatments on both sand-based and native soil greens (Nikolai et al., 2001). Hartwiger et al. (2001) did show an increase (11-12%) in thatch accumulation for rolled treatments compared to non-rolled treatments. However, we observed reduced dollar spot and thatch accumulation on a golf course that was experimenting with rolling on tee boxes (personal observation). The effects of rolling on thatch accumulation would be of significant interest to superintendents and could reduce verticutting on fairways. Another potential benefit from rolling that has been anecdotally reported is reduced mowing frequency and height (Pioppi, 2014). However, these reports have not been substantiated by any scientific studies and require further examination. In total, reduced fungicide inputs, reduced mowing, reduced thatch and improved fairway firmness would be a welcome addition to any golf course, however, there is little information on the potential positive or negative consequences of implementing fairway-rolling programs.

Overall, we would like to comprehensively look at fairway rolling and to provide an overview of how superintendents can practically implement this practice. We plan to look at the rolling frequency (times per week) that is needed to reduce dollar spot severity in conjunction with different fungicide spray programs to determine the extent of fungicide reduction that can be

realized. We also plan to look at the impact of rolling on soil compaction, clipping yield, thatch levels, and root density. We feel these are key agronomic factors that would influence superintendents when deciding if rolling programs make sense at their facilities. Furthermore, we feel that this information would be crucial for superintendents to use when justifying the capital funds needed for such purchases.

### **Objectives:**

1. Determine the affect of rolling frequency (times per week) on the dollar spot severity and any other diseases observed during the trial.
2. Determine if using a threshold based spray schedule compared to a calendar based spray schedule can reduce fungicide applications.
3. Determine the before and after affect of rolling frequency (times per week) on soil compaction, thatch level and root density.
4. Determine the affect of rolling frequency on clipping yield (dry weight).

### **Materials and Methods**

The field trial is being conducted at the University of Massachusetts, Joseph Troll Turfgrass Research Center (South Deerfield, MA) on a creeping bentgrass and annual bluegrass mowed three times per week at fairway height (0.5 inches). Irrigation is provided as needed. The site is provided with 1.0-1.5 lbs of N/1,000 ft<sup>2</sup> annually. Management of turfgrass insects and weeds will be at the discretion of the superintendent.

The trial will be a 4 x 3 factorial design with rolling frequency as one main effect and fungicide application as the other. Rolling treatments will be performed with a Smithco Ultra 10 fairway roller. Rolling treatments will be performed 0, 3, 4 (double roll twice per week) and 6 (double roll 3 times per week) times per week. Fungicide treatments will consist of a non-treated control, calendar-based spray program (21-day interval) and threshold-based spray program. Treatments will be replicated four times and a randomized complete block design will be used. The calendar-based spray program will begin in the 1<sup>st</sup> week in June and the threshold-based program will begin once 5% dollar spot is observed in the 1x week rolled treatment plot. Rolling treatment plots are 10 ft x 24 ft per replication and fungicide treatments are 6 x 6 ft within each rolling frequency. Turfgrass diseases (primarily dollar spot) will be evaluated on a weekly basis after they are observed. Turf quality rating will be evaluated on a weekly basis (1-9 scale, 6 being acceptable). Soil samples will be collected before treatments begin (June) and after the treatments commence (September) and bulk density will be determined to assess compaction. Thatch levels will be measured before (June) and after (September) treatments. Root density will also be measured before and after treatments (Pang et al., 2011). Grass clippings will be collected and dried once per month to determine if rolling frequency influences clipping yield.

### **Why this research is important to the New England turfgrass industry:**

Fairway rolling is a new idea and can become a large component to add to weekly maintenance planning. If fairway rolling can show a substantial reduction in disease severity and reduced clipping yield (potential to reduce mowing frequency), these factors can potentially provide the budgetary savings to incorporate fairway rolling. Comparison of fungicide programs is aimed at quantifying the amount of fungicide applications that could be reduced over the course of the season. Furthermore, the potential to reduce a single weekly mowing event can generate substantial fuel savings and have positive influence on lease agreements as well. On the other hand, it will be important to determine if rolling on a weekly basis will create any deleterious effects on plant and soil health (compaction, root density, thatch accumulation). Moreover, this may be a new cultural practice that could reduce fungicide usage and be marketed as a more sustainable method to manage turfgrass diseases. Furthermore, if rolling can reduce fungicide usage, this could also reduce the risk of fungicide resistance development by reducing selection events (i.e. yearly fungicide applications). All in all, fairway rolling is a cultural practice that could have huge benefits and change the way fairways are managed, however, there are crucial baseline questions (compaction, root density, actual disease reduction) that must be answered to accurately evaluate implementing this practice.

### Mt. Sugarloaf

	Rep 1				Rep 2				Rep 3				Rep 4						
Frequency	0	3X	4X	6X		3X	6X	0	4X		4X	0	6X	3X		6X	4X	3X	0
Fungicide Schedule	U <sup>z</sup>	T	C	T		T	U	C	U		C	T	U	C		T	C	U	T
	C <sup>y</sup>	U	T	U		U	C	T	C		T	U	C	T		U	T	T	U
	T <sup>x</sup>	C	U	C		C	T	U	T		U	C	T	U		C	U	C	C

<sup>z</sup> Untreated

<sup>y</sup> Calendar based spray program.

<sup>x</sup> Threshold based spray program.

Fungicide schedule for the Calendar based spray program.			
Spray time	Fungicide	Rate per 1,000 ft <sup>2</sup>	Application Interval <sup>z</sup>
1	Torque	0.6 oz	21 day
2	Chipco GT	4.0 oz	21 day
3	Secure	0.5 oz	21 day
4	Xzemplar	0.26 oz	21 day
5	Chipco GT	4.0 oz	21 day
6	Emerald	0.18 oz	21 day

<sup>z</sup> The threshold based spray program will use the same application schedule, but will only be applied when 5% disease severity is reached.