

Rolling and Dew Removal Effects on Dollar Spot Disease of Creeping Bentgrass

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Introduction

- Dollar spot disease (caused by *Sclerotinia homoeocarpa*) is the most commonly managed disease on golf course turfs
- Minimizing leaf wetness duration with morning dew removal can be an effective tool for reducing dollar spot severity (Williams et al., 1996; Nikolai et al., 2001; Ellram et al., 2007; Pigati et al. 2010; Delvalle et al. 2011; Putman and Kaminski, 2011; Giordano et al. 2012)
- Mowing between 4am and 8am on fairways has been the most common and effective dew removal technique for reducing dollar spot (Williams et al., 1996; Nikolai et al., 2001; Ellram et al., 2007; Pigati et al. 2010; Delvalle et al. 2011)
- Giordano in 2012, showed on putting greens, rolling in the morning when dew is present or in the afternoon when no dew is present, reduced dollar spot disease incidence
- Fairway turf encompasses the largest area on golf courses
- However, no studies have compared the effectiveness of time (either morning or afternoon) of lightweight rolling on fairway turf

Objective

Assess effects of Time of day and Frequency of lightweight rolling on dollar spot disease incidence of creeping bentgrass fairway turf

Materials & Methods

Field Management

- Creeping bentgrass ('Independence' *Agrostis stolonifera*)
- Plots were mowed at a height of 12.7 mm using a triplex mower 3 d/wk
- Irrigation was used to replace 70% daily evapotranspiration on an as needed basis
- Nitrogen Fertility:
 - 2015 – 131 kg/ha
 - 2016 – 93 kg/ha

Experimental Design

- 2 x 2 factorial arranged as a RCBD with four blocks
- Time of Day
 - AM rolling (between 0730h and 0800h); dew
 - PM rolling (between 1200h and 1500h); no dew
- Frequency of Rolling
 - 3 d/wk (non-mowed days)
 - 6 d/wk
- Additional Treatments
 - Untreated Control
 - Absorbent fabric to completely remove dew

Data Collection

- Number of infection centers were collected every 3 to 6 d
- Data subjected to ANOVA using GLM procedure in SAS
- Means separated using Fisher's protected LSD ($p < 0.05$)
- Disease incidence summarized over time using area under disease progress curve (AUDPC) (Madden et al., 2007)

Lightweight Roller

- A vibratory rolling System (Model True Surface Trekker Vibe V) on a walk-behind mower (Model Flex 21, Toro Co.) (right)



Results

Table 1. ANOVA of three trial runs; fall 2015, spring 2016, fall 2016. Time of day factor was highly significant across all three runs. Frequency was not significant. The time of day by frequency interaction was highly significant in trial run of fall 2016.

| | Area Under Disease Progress Curve (AUDPC) | | |
|----------------------------|---|-------------|-----------|
| | Fall 2015 | Spring 2016 | Fall 2016 |
| <u>Planned F-test</u> | | | |
| Control vs. All Rolling | * | * | * |
| <u>Source of Variation</u> | | | |
| Time of Day | *** | *** | *** |
| Frequency (Freq.) | NS | NS | NS |
| Time of Day * Freq. | NS | NS | *** |

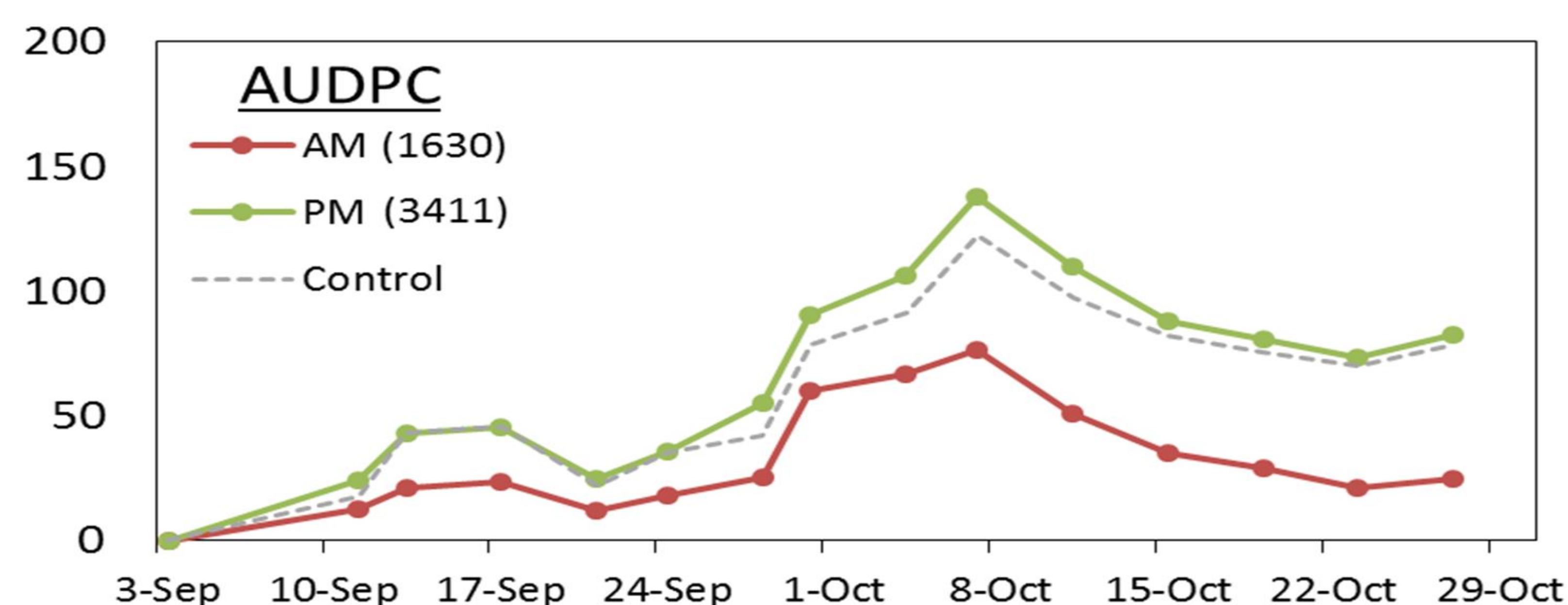


Figure 1. Time of day effect in fall 2015 trial run. AM rolling (red line) significantly reduced dollar spot incidence compared to PM rolling (green line). The control (dotted grey line) is only included for reference.

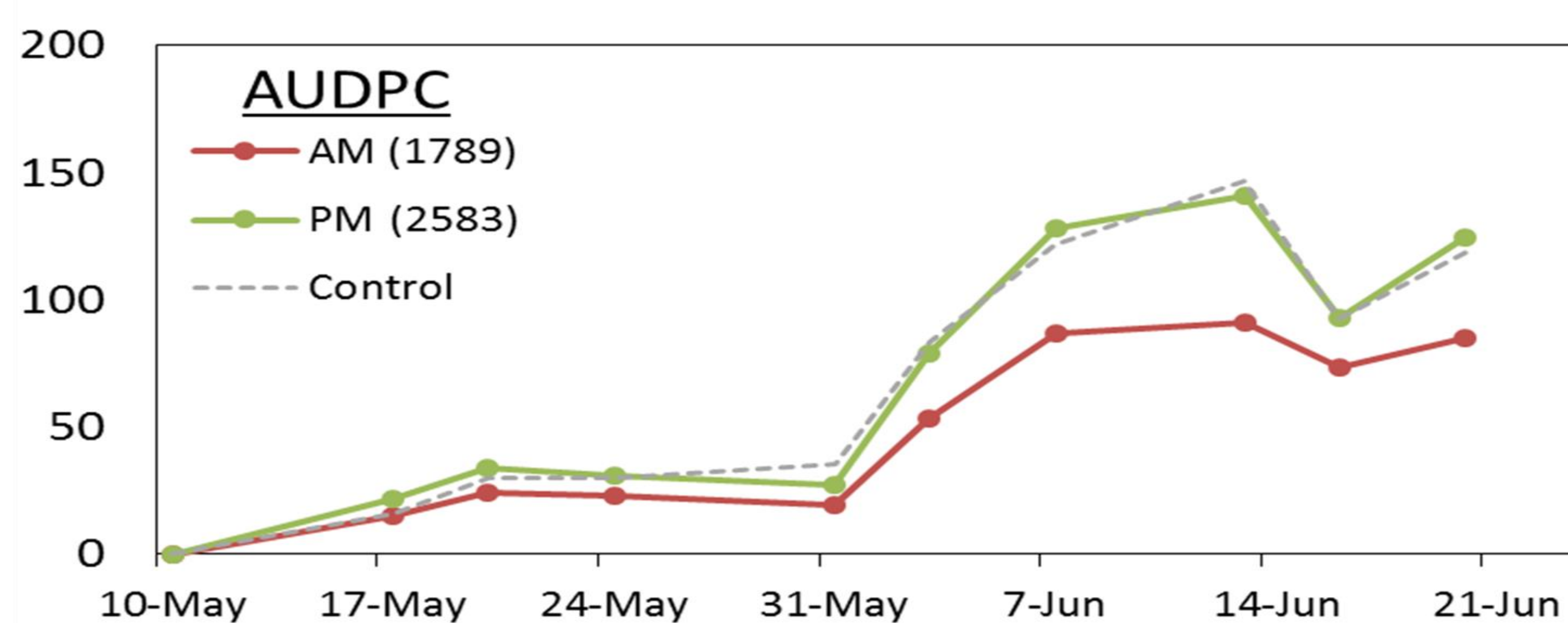


Figure 2. Time of day effect for spring 2016 trial run. AM rolling (red line) significantly reduced dollar spot incidence compared to PM rolling (green line). The control (dotted grey line) is only included for reference.

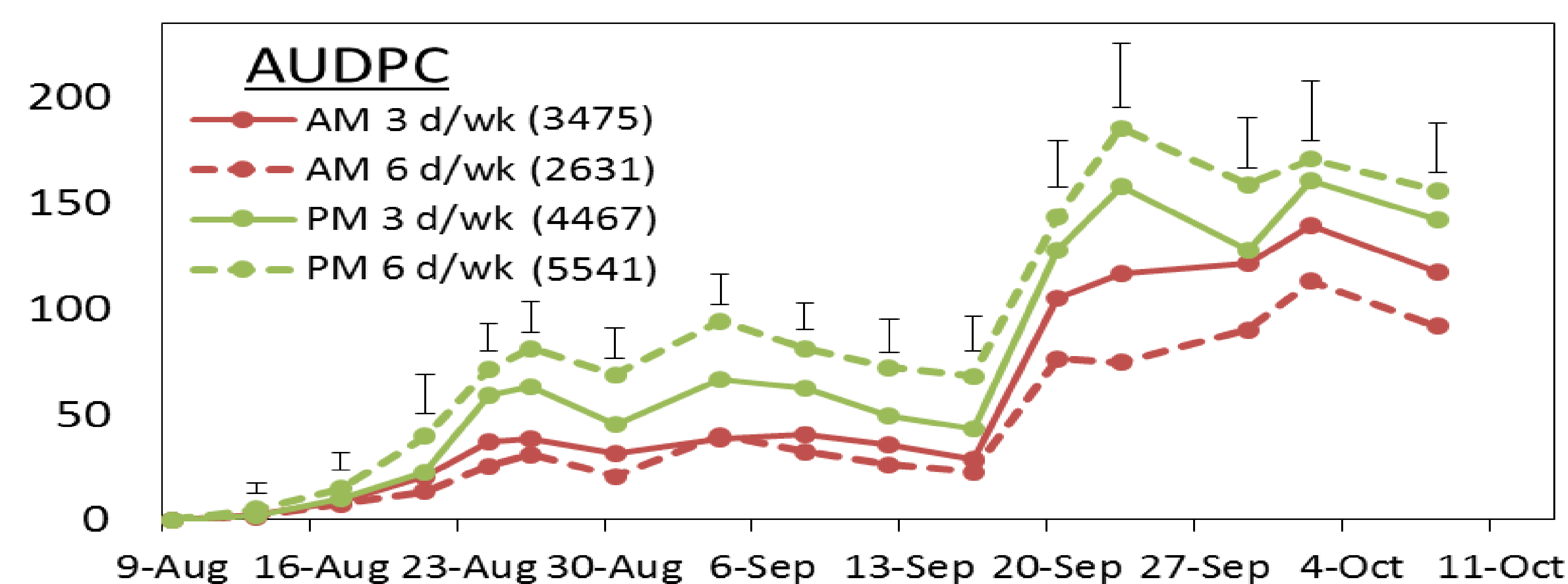


Figure 3. Time of day by frequency interaction effect for fall 2016 trial run. More frequent (6 d/wk) rolling in AM (dotted red line) reduced disease incidence compared to AM rolling 3 d/wk; whereas, more frequent (6 d/wk) rolling in PM (dotted green line) increased disease incidence compared to 3 d/wk rolling.

Conclusions

- Timing was the most important factor to reduce disease incidence; AM rolling (left), PM rolling (right)



- Frequency had little or no effect on disease. Interactions in fall 2016 (AUDPC) and a few observation dates in fall 2015 (data not shown) suggest that more frequent (6 d/wk) AM rolling may be more effective than AM rolling on non-mowing days.
- Absorbent fabric that removed dew and guttation water reduced disease similar to AM rolling 6 d/wk (data not shown).

Future Directions

- Repeat trial next year to determine whether frequency interaction with time of day is reproducible.
- Determine if disease predictive models can be used to time the need for rolling and improve cost effectiveness of practice.

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