2016 Interim Progress Report
Rolling and Resistance: A Means to Reduced Fungicide Usage on Golf Course Greens
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Executive Summary:
A dollar spot management study investigating the combined use of cultural, genetic, and chemical practices was initiated in May, 2016 at the Hancock Turfgrass Research Center on the campus of Michigan State University in East Lansing, MI. In the research trial, two cultivars of creeping bentgrass including a commonly used dollar spot-susceptible cultivar, Penn A1, and a recently released dollar spot-resistant cultivar, Flagstick, were compared. For each cultivar, lightweight rolling conducted once or twice for five days weekly combined with reduced rate fungicide (boscalid) applications at 25% of the label rate was evaluated for dollar spot incidence, turfgrass quality and playability as measured by greens speed. Preliminary data suggests that a reduction of fungicide rate combined with rolling and resistant cultivar use may result in dollar spot incidence similar to that achieved with full label rates of fungicide.

Update on Current Research Progress:
Research Methodology

To investigate combined management practices for dollar spot reduction, a research study was established in a 2 x 7 split plot design on a creeping bentgrass putting green at the Hancock Turfgrass Research Center, East Lansing, MI. Whole plot factors included two different creeping bentgrass cultivars which were replicated three times and included Penn A1, a commonly used susceptible cultivar, and Flagstick, a newly released, dollar spot resistant cultivar. Seven subplot treatments were established randomly within cultivar whole plots as listed below.

Fungicide applications were made monthly (every 28 days) using a CO_2-powered backpack sprayer with a double-nozzle boom containing two Tee Jet (8002 E) flat fan nozzles at a spray volume of approximately 900 L ha^{-1}. Fungicide applications were made with boscalid (Emerald) at 0.055 g m^{-2} (full label rate) or 0.014 g m^{-2} (25% label rate) on 6/30/6, 7/27/16, and 8/26/16. Rolling treatments were applied 5 days each week beginning on 5/11/16 using a Tru-Turf R52-11T lightweight roller with a 1.3 m width. A single pass (1x) was made rolling from one end of each subplot to the other end. A double pass (2x) was made by rolling down and then immediately back within each subplot. Rolling treatments were applied between 7:00 and 9:00 am each day immediately following morning mowing. Within each Penn A1 and Flagstick replication, seven treatments were tested as listed below.

For each replicate of each creeping bentgrass cultivar (Penn A1 and Flagstick), the following subplot treatments were randomly located and applied:

1. Rolling once per day (single pass, 1x)
2. Rolling twice per day (double pass, 2x)
3. Rolling once per day (1x) with fungicide 0.014 g m^{-2} (25% rate monthly)
4. Rolling twice per day (2x) with fungicide 0.014 g m^{-2} (25% rate monthly)
5. Fungicide 0.014 g m^{-2} (25% rate monthly)
6. Fungicide 0.055 g m^{-2} (full label rate monthly)
7. Untreated control

General Plot Maintenance

Plots were mowed 5 days weekly at 3 mm using a Toro Greensmaster 1000 walk-behind reel mower. Mowing height was adjusted periodically to alleviate environmental stress on the stand. Plots were lightly topdressed weekly through June and July, 2016. The entire site was treated with trinexepac-ethyl (Primo) at 3.18 L ha^{-1} biweekly as needed in addition to carfentrazone-ethyl (Quicksilver) at 0.49 L ha^{-1} for moss, Revolution at 9.54 L ha^{-1} for localized dry spots, and mefenoxam (Subdue Maxx) at 3.18 L ha^{-1} for the non-target disease yellow tuft. On 7/28/16 and 8/5/16, plots were inoculated with a sand-cornmeal topdressing mixture infested with *Sclerotinia homoeocarpa*, the causal agent of dollar spot, to ensure uniform disease development. Foliar fertilizer was applied as needed, at approximately 4.88 kg N ha^{-1} weekly.

Data Collection

Assessments for dollar spot disease were made on a 0-100% scale by visually estimating the percentage of each plot exhibiting dollar spot symptoms. Turfgrass quality was visually measured using a 1-9 scale, where 6 represents acceptable turfgrass quality, 9 is excellent, and 1 is poor. Turf color ratings, or greenness, were collected using a FieldScout TCM 500 NDVI Turf Color Meter, and turfgrass chlorophyll measurements were collected using a Fieldscout CM 1000 chlorophyll meter. For both NDVI and chlorophyll meter data, the mean of six measurements was used. Greenspeed was assessed weekly using a Pelz meter. Measurements consisted of the average six ball roll measurements, three in opposite directions. Photographs were taken periodically throughout the trial period. NDVI, chlorophyll meter, and pelz meter data were collected weekly beginning the week of 5/16/16. Statistical analysis of data will be made upon completion of data collection. Data analysis will be performed on all data collected using the most appropriate statistical model after analysis of variance tests are confirmed significant.

Current Results

Assessments are still being made so data tables are not currently available but will be provided in the detailed annual report. Preliminary data suggests that:

1.) Emerald at recommended rate and 25% of the recommended rate applied on a 28 interval were the best treatments with or without rolling.
2.) Flagstick without fungicide treatments rolled either once or twice daily five times a week had less dollar spot than to untreated control.
3.) Penn A-1 without fungicide treatments rolled twice daily five times a week had less dollar spot compared to the untreated control.
4.) Penn A-1 without fungicide treatments rolled once daily five times a week was not significantly different from the untreated control.
5.) Without fungicide, Flagstick rolled either once or twice a day had less dollar spot then Penn A-1 rolled once or twice a day.
6.) Based on preliminary data, there appears to be more of an impact of rolling on the resistant cultivar, Flagstick, compared to the susceptible cultivar, Penn A-1.

PROJECT EXPENDITURES/ENCUMBRANCES TO DATE:

Current Project Expenditures	**2016**
Salary + fringe	$9,041
Consumables	$248
Indirect costs	$2,196
Total:	**$11,485**