



Fungicide Alternative Management Practices for Microdochium Patch

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Introduction:

Microdochium patch can be observed year-around in some cool, humid regions, and damages nearly all grass species in Western Canada and the Pacific Northwest. Microdochium patch is a major disease on golf course putting greens from September through May. Under favorable conditions, this disease can injure or kill significant amounts of turf which greatly disrupts the aesthetics and playability of the putting green surface. Historically, more money has been spent on fungicides to combat this disease in Western Canada and the Pacific Northwest than any other turfgrass disease. Currently, fungicides applied every 3 to 4 weeks to putting greens throughout the 9 month period of disease activity are the primary means for providing control of this pathogen, which equates to roughly \$20,000 annually per golf course.

In recent years increasing pesticide bans and restriction have affected turfgrass management. Considering this, little information exists regarding alternative integrated management strategies that might significantly reduce or eliminate the need for fungicide applications. The overall objective of this research theme is the exploration of fungicide alternative management of Microdochium patch on annual bluegrass putting greens.

Preliminary Research (February to May 2013):

Preliminary trials were started in February 2013 at the Oregon State University Lewis-Brown Farm, Corvallis, OR in order to pursue promising potential methods of alternative disease control. Preliminary research on Civitas, Sulfur and PK plus were promising. However, the trials evaluating the effects of soil acidifier, copper soap, neem oil, charcoal, baking soda and borax were inconclusive along with the use of short-wave length (UV-C) radiation applied using the GreenZap; therefore, these treatments were not included in the research initiated in the fall of 2013. An additional trial initiated in February 2013, focused on dew removal, determined that rolling significantly reduced disease occurrence (Image 1), while daily treatments with a blower (buffalo blower with a sand-devil attachment) and dew whip did not reduce disease severity.

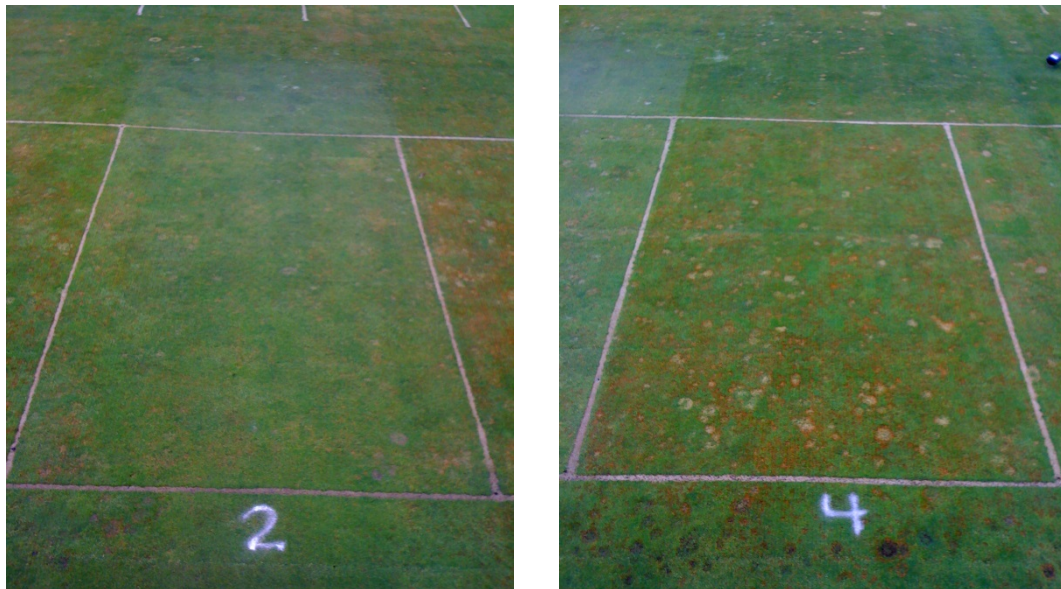


Image 1: Effects of weekly rolling (left) in comparison to the control observed April 6, 2013, over 4 months without fungicide applications (research initiated – February 2013).

Current Research (Initiated Fall 2013):

In continued exploration of fungicide alternative products and practices for management of *Microdochium* patch a series of experiments were initiated at the Oregon State University Lewis Brown Horticulture Farm and at the Washington State University Goss Research Farm, Puyallup, WA on September 26, 2013 (Image 2).

Objectives of these projects were to explore the effects of i) winter applied Civitas, sulfur and phosphite, ii) winter applied combinations of nitrogen and iron sulfate, and

iii) winter applied biocontrol products on *Microdochium* patch activity. These factors were explored with and without winter rolling treatments. A second dew removal project was also initiated in the fall 2013 exploring daily rolling, in comparison to daily treatment with a dew brush, and frequent surfactant applications throughout the winter months.



Image 2: Graduate Assistant, Clint Mattox, applies a series of fungicide alternative products exploring pesticide free control of *Microdochium* patch at the OSU Lewis Brown Farm in Corvallis, OR, September 26, 2013.

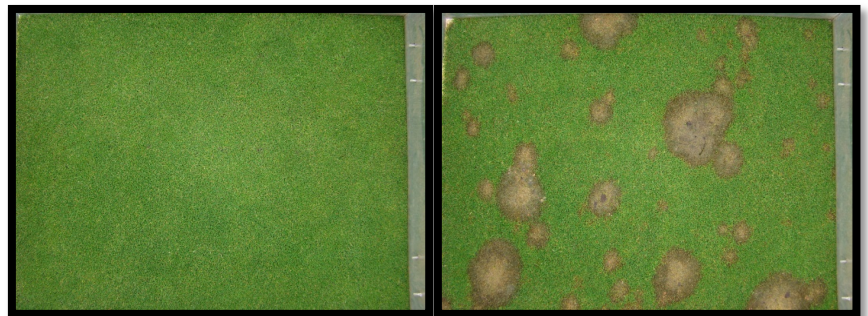


Image 3: Effects of Civitas One + Sulfur DF applied every 2 weeks (left) in comparison to the control (right)

Promising treatments in fall 2013 initiated trials include Civitas One applied at 8.5 oz/1,000 ft², Sulfur DF applied at 0.25 lbs S/1,000 ft², and iron sulfate and nitrogen applied at 2.0 lbs Fe SO₄ and 0.10 lbs N/1,000 ft², all applied every 2 weeks to an annual bluegrass putting green (Image 3 and 4). These treatments are currently (as of December 28, 2013) providing greater than 95% control of Microdochium patch without fungicides. Current research at Oregon State and Washington State will be continued into the spring and then repeated for a second year in the fall of 2014.

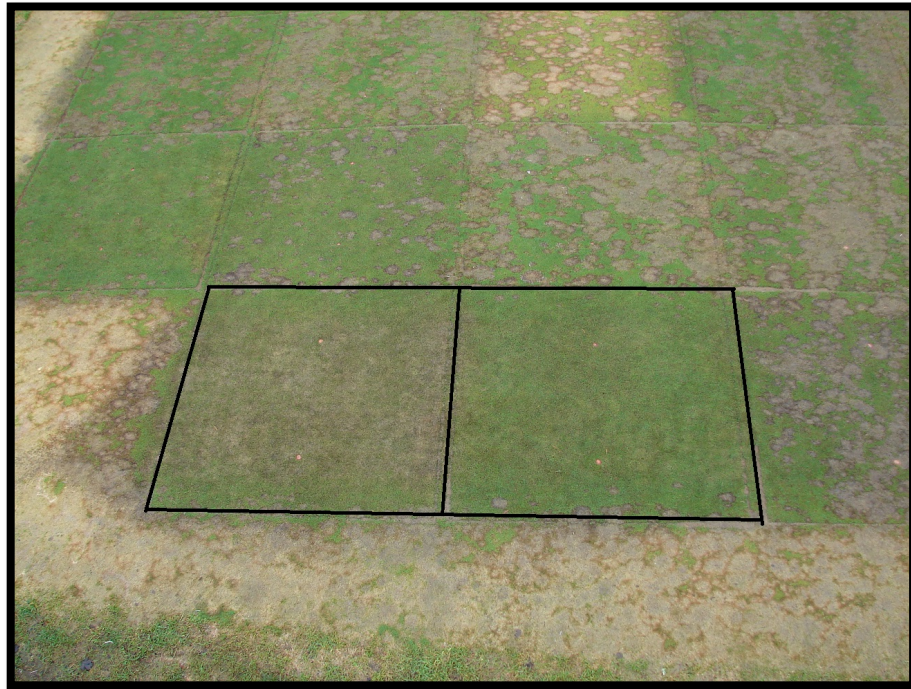


Image 4: Effects of iron sulfate, applied at 2 lbs FeSO₄ per 1,000 ft² every 2 weeks (left), and nitrogen, applied at 0.1 lbs N, plus iron sulfate, at 2 lbs FeSO₄ per 1,000 ft² every 2 (right) on Microdochium patch incidence and annual bluegrass putting green health, picture collected Jan 10, 2014 (4 months after the fall 2013 initiation date). Note: the poor quality associated with the plot on the left is the result of foot traffic, which is applied to all treatments in the study.

Reduced Cost:

Initial calculations derived using promising preliminary findings (effects of Civitas One applied with Sulfur DF) translates to substantial financial savings. For instance the cost to treat the putting greens on a typical golf course (2 acres) with Civitas One and Sulfur DF every two weeks over a 9 month period at the rates utilized in this research (8.5 oz/1,000 ft² and 0.25 lbs S/1,000 ft², respectively) translate to \$5,470 (\$840 for Sulfur DF per season and \$4,630 for Civitas One per season) for management of Microdochium patch, a savings of \$14,530 for the typical golf course, which spends on average \$20,000 in fungicides to management this pathogen. This translated to a savings of \$4,520,955 in the Pacific Northwestern United States (1,653 acres) of putting greens if these cultural practices were used in place of fungicide applications. Applications of Civitas One plus potassium phosphite (PK plus), and iron sulfate plus light rates of nitrogen would translate to similar savings and provide a fungicide alternative rotation for elemental sulfur (Sulfur DF) applications.

Fewer Fungicides:

While these projected financial savings are significant, it is important to point out that this control is being provided without the use of pesticides, which are continually facing increasing bans and restrictions across the United States, Canada and the world. Projected fungicide applications on a typical golf course for control of this pathogen range from 11 to 18 applications over a 9 month period.

Sulfur and Soil pH (Future Research):

Researchers at Oregon State University have also initiated work intended to balance or offset the potential detrimental effects associated with elevated rates of sulfur and iron sulfate (i.e. acidic soil conditions) on annual bluegrass putting greens, which the above treatments will likely produce.

Objectives of this research are to i) determine if sulfur applied with and without various calcium sources can reduce the number of annual fungicide applications necessary to manage Microdochium patch, ii) evaluate the effects of various sulfur applications rates applied with and without differing calcium sources on annual bluegrass health and vigor, and finally iii) explore potential correlations between soil pH, turf health and Microdochium patch incidence.

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Funding for these research projects have been provided by...

- Western Canada Turf Association
- Northwest Turf Association
- Western IPM Center
- United States Golf Association
- Oregon Golf Course Superintendents Association
- Oregon Turf Foundation