Effects of Sulfur, Calcium Source and pH on Microdochium Patch
USGA ID#: 2014-10-499

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Research Summary (Year 2)
- Sulfur applications reduced Microdochium patch on an annual bluegrass putting green.
- Sulfur applications resulted in fewer curative fungicide applications when using the development of infection centers as an action threshold to control Microdochium patch.
- Sulfur applications decreased turf color and increased Anthracnose activity when summer fungicides were not applied.

Introduction

Historically, more money is spent on fungicides to combat Microdochium patch (*Microdochium nivale*) in the Pacific Northwest and Western Canada than any other turfgrass disease. As a result of the financial burden and the potential for development of fungicide resistance associated with frequent fungicide applications, as well as growing pesticide bans and restrictions, turf managers as a whole are looking for methods to mitigate pesticide applications. Therefore, the primary objective of this research is to determine if sulfur applied with and without various calcium sources can reduce the number of annual fungicide applications necessary to manage Microdochium patch on annual bluegrass.

Year Two Findings

The results in 2015 were similar to those in 2014, albeit muted by the unusual dry winter. In comparison to the control which required 2.8 applications over an 8 month period, plots treated with 3.0 and 6.0 lbs. sulfur/1,000 ft^2 annually required 2.4 and 1.9 fungicides applications, respectively (Table 1). Medium and high rates of sulfur did reduce the number of infection centers in February, but the differences were small (1 infection center or less).

Sulfur applications reduced turf color ratings by 0.5 points in June 2015 (Table 2). Percent anthracnose disease was slightly higher in August of 2015 with the medium and high rates of sulfur averaging 0.75 and 2.5 percent disease, respectively, compared to the control which averaged 0.08 percent disease. No fungicides were applied for anthracnose.

Table 1: Effects of sulfur rate and calcium type on Microdochium patch infections centers observed in February 2015, and the number of fungicide applications made to control Microdochium patch from Oct 1, 2014 to May 31, 2015, Corvallis, OR.

Sulfur rate[z]	Microdochium patch infection centers (per 25 ft^2)	Number of Microdochium patch fungicide applications[y]
0 lbs	1.4 a[x]	2.8 a
3 lbs	0.6 b	2.4 b
6 lbs	0.4 b	1.9 c
Calcium source[w]		
None	0.8 a	2.3 a
Calcium carbonate	1.0 a	2.7 a
Calcium sulfate	0.9 a	2.4 a
Calcium phosphate	0.6 a	2.1 a

[z] 0.0, 3.0 and 6.0 lbs. sulfur/1,000 ft^2 annually, applied at 0.25 and 0.5 lbs. sulfur/1,000 ft^2 per month x 12 months, respectively from Jan 2009 to Dec 2015. From Mar 2005 to Dec 2008, 0.0, 1.5 and 3.0 lbs. sulfur/1,000 ft^2 annually, applied at 0.125 and 0.25 lbs. sulfur/1,000 ft^2 per month x 12 months, respectively.

[y] Fungicide applications of propiconazole plus PCNB (2.0 fl. oz + 6.0 fl. oz/1,000 ft^2) were made on a per plot basis using the following infection threshold, 5 small spots or one spot exceeding 1 inch in diameter, from Oct 1, 2014 to May 31, 2015.

[x] Means followed by the same letter within each factor of S rate and calcium source are not significantly different according to Fishers' Protected LSD (α=0.05).

[w] All calcium sources were applied after core cultivation in May and Sep from 2005 to 2015 at a rate of 12.5 lbs product/1,000 ft^2, totaling 25.0 lbs. product/1,000 ft^2 annually.

Table 2: Effects of sulfur rate and calcium source on turf color observed in June 2015 and percent Anthracnose cover (0-100%) observed in August 2015 in Corvallis, OR.

Sulfur rate[z]	Turf color (1-9)	Percent Anthracnose cover (0-100%)[y]
0 lbs	7.0a[x]	0.08a
3 lbs	6.6ab	0.75b
6 lbs	6.4b	2.50b
Calcium source[w]		
None	6.5b	1.5a
Calcium carbonate	7.1a	0.5a
Calcium sulfate	6.7ab	1.6a
Calcium phosphate	6.4b	0.9a

[z]0.0, 3.0 and 6.0 lbs. sulfur/1,000 ft2 annually, applied at 0.25 and 0.5 lbs. sulfur/1,000 ft2 per month x 12 months, respectively from Jan 2009 to Dec 2015. From Mar 2005 to Dec 2008, 0.0, 1.5 and 3.0 lbs. sulfur/1,000 ft2 annually, applied at 0.125 and 0.25 lbs. sulfur/1,000 ft2 per month x 12 months, respectively.

[y]No fungicides were applied to these plots after the conclusion of the 1 Oct 2014 to 31 May 2015 Microdochium patch scouting cycle.

[x]Means followed by the same letter within each factor of S rate and calcium source are not significantly different according to Fishers' Protected LSD (α=0.05).

[w]All calcium sources were applied after core cultivation in May and Sep from 2005 to 2015 at a rate of 12.5 lbs product/1,000 ft^2, totaling 25.0 lbs. product/1,000 ft^2 annually.