

Seasonal Programs for Disease Control on Golf Course Fairways



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OBJECTIVE

To determine the efficacy of fungicide programs for the season-long control of turfgrass diseases and abiotic stresses on golf course fairways.

MATERIALS AND METHODS

The study was conducted at the O.J. Noer Turfgrass Research and Education Facility on a stand of creeping bentgrass (*Agrostis stolonifera*) maintained at a 0.5 inch mowing height. The individual plots measured 3 ft X 10 ft and were arranged in a randomized complete block design with four replications. Individual treatments were applied at a nozzle pressure of 40 p.s.i using a CO₂ pressurized boom sprayer equipped with two XR Teejet 8004 VS nozzles. All fungicides were agitated by hand and applied in the equivalent of 2 gallons of water per 1000 ft². Five different fungicide programs were initiated on May 21st and subsequent applications made every 14 or 21 days. Number of dollar spot infection centers per plot, turfgrass quality (1-9, 9 being excellent, 6 acceptable, and 1 bare soil), and normalized difference vegetation index (NDVI) were assessed every two weeks. Results were subjected to an analysis of variance and means were separated using the Waller-Duncan test ($P = 0.05$). Results of the disease severity and turfgrass quality ratings can be found in table 1 and 2, respectively.

RESULTS AND DISCUSSION

Dollar spot pressure was high throughout most of 2014, reaching extreme levels near the end of August as non-treated controls averaged 1000 foci per plot on the August 28th rating date. All programs reduced dollar spot relative to the non-treated control on July 16th with the exception of program 6, however on August 28th no programs reduced dollar spot relative to the non-treated control except for program 6. The most likely explanation for this is the timing of the fungicide applications of each program, with a 3-way fungicide mixture being applied in early August. Turfgrass quality generally mirrored disease severity ratings, with the highest quality for most of the summer provided by programs 3 and 4. No program provided acceptable quality on the August 28th rating date. Phytotoxicity was not observed with any treatment.

Table 1. Mean number of dollar spot infection centers per treatment at the O. J. Noer Turfgrass Research and Education Facility in Madison, WI in 2014.

	Treatment	Rate	Application Date	Dollar spot severity ^a			
				Jun 20	Jul 16	Aug 28	
1	Non-treated control			3.3a	555.8a	1039.0a	
2	Tartan (A)	2.0	FL OZ/M	May 21	0.5b	223.bc	917.8a
	Fiata (B)	4.4	FL OZ/M	June 5			
	Daconil Ultrex (B)	3.2	OZ/M	June 5			
	Primo (B)	0.25	FL OZ/M	June 5			
	Mirage SC (D)	2.0	FL OZ/M	June 17			
	Daconil Ultrex (E)	3.2	OZ/M	July 1			
	Fiata (E)	4.4	FL OZ/M	July 1			
	Primo (E)	0.25	FL OZ/M	July 1			
	Mirage SC (F)	1.0	FL OZ/M	July 16			
	Fiata (H)	4.4	FL OZ/M	July 31			
	Daconil Ultrex (H)	3.2	OZ/M	July 31			
	Primo (H)	0.25	FL OZ/M	July 31			
	Mirage SC (I)	1.0	FL OZ/M	Aug 14			
Interface (J)	4.0	FL OZ/M	Aug 27				
3	Tartan (A)	2.0	FL OZ/M	May 21	0.3b	168.3c	958.3a
	Daconil Ultrex (B)	3.2	OZ/M	June 5			
	Fiata (B)	5.9	FL OZ/M	June 5			
	Primo (B)	0.25	FL OZ/M	June 5			
	Mirage SC (D)	2.0	FL OZ/M	June 17			
	Fiata (E)	5.9	FL OZ/M	July 1			
	Daconil Ultrex (E)	3.2	OZ/M	July 1			
	Primo (E)	0.25	FL OZ/M	July 1			
	Mirage SC (F)	1.0	FL OZ/M	July 16			
	Fiata (H)	5.9	FL OZ/M	July 31			
	Daconil Ultrex (H)	3.2	OZ/M	July 31			
	Primo (H)	0.25	FL OZ/M	July 31			
	Mirage SC (I)	1.0	FL OZ/M	Aug 14			
Interface (J)	4.0	FL OZ/M	Aug 27				
4	Tartan (A)	2.0	FL OZ/M	May 21	0.0b	201.0c	881.8a
	Fiata (B)	4.4	FL OZ/M	June 5			
	Daconil Ultrex (B)	3.2	OZ/M	June 5			
	Primo (B)	0.25	FL OZ/M	June 5			
	Fiata (D)	4.4	FL OZ/M	June 17			
	Mirage SC (D)	2.0	FL OZ/M	June 17			
	Fiata (E)	4.4	FL OZ/M	July 1			
	Daconil Ultrex (E)	3.2	OZ/M	July 1			
	Primo (E)	0.25	FL OZ/M	July 1			
	Fiata (F)	4.4	FL OZ/M	July 16			
	Mirage SC (F)	1.0	FL OZ/M	July 16			
	Fiata (H)	4.4	FL OZ/M	July 31			
	Daconil Ultrex (H)	3.2	OZ/M	July 31			
Primo (H)	0.25	FL OZ/M	July 31				
Fiata (I)	4.4	FL OZ/M	Aug 14				
Mirage SC (I)	1.0	FL OZ/M	Aug 14				
Interface (J)	4.0	FL OZ/M	Aug 27				

5	Tartan (A)	2.0	FL OZ/M	May 21	0.3b	148.5c	920.8a
	Fiata (C)	5.9	FL OZ/M	June 12			
	Mirage SC (C)	2.0	FL OZ/M	June 12			
	Primo (C)	0.25	FL OZ/M	June 12			
	Fiata (E)	5.9	FL OZ/M	July 1			
	Chipco 26019 (E)	4.0	FL OZ/M	July 1			
	Fiata (G)	5.9	FL OZ/M	July 23			
	Mirage SC (G)	1.5	FL OZ/M	July 23			
	Primo (G)	0.25	FL OZ/M	July 23			
	Fiata (I)	5.9	FL OZ/M	Aug 14			
	Chipco 26019 (I)	4.0	FL OZ/M	Aug 14			
	Fiata (K)	5.9	FL OZ/M	Sep 4			
	Interface (K)	4.0	FL OZ/M	Sep 4			
Primo (K)	0.25	FL OZ/M	Sep 4				
6	Tartan (A)	2.0	FL OZ/M	May 21	0.0b	419.8ab	372.5b
	Fiata (D)	8.8	FL OZ/M	June 17			
	Mirage SC (D)	2.0	FL OZ/M	June 17			
	Daconil Ultrex (D)	3.2	OZ/M	June 17			
	Primo (D)	0.25	FL OZ/M	June 17			
	Fiata (F)	8.8	FL OZ/M	July 16			
	Mirage SC (F)	2.0	FL OZ/M	July 16			
	Daconil Ultrex (F)	3.2	OZ/M	July 16			
	Primo (F)	0.25	FL OZ/M	July 16			
	Fiata (I)	8.8	FL OZ/M	Aug 14			
	Chipco 26019 (I)	4.0	FL OZ/M	Aug 14			
	Daconil Ultrex (I)	3.2	OZ/M	Aug 14			
	Primo (I)	0.25	FL OZ/M	Aug 14			

^aDollar spot was visually assessed as number of dollar spot infection centers per plot. Means followed by the same letter do not significantly differ (P=.05, Waller-Duncan).

Table 2. Mean turf quality ratings per treatment at the O. J. Noer Turfgrass Research and Education Facility in Madison, WI in 2014.

	Treatment	Rate	Application Date	Turfgrass Quality ^a			
				Jun 20	Jul 16	Jul 16	
1	Non-treated control			7.0a	4.0d	3.3b	
2	Tartan (A)	2.0	FL OZ/M	May 21			
	Fiata (B)	4.4	FL OZ/M	June 5			
	Daconil Ultrex (B)	3.2	OZ/M	June 5			
	Primo (B)	0.25	FL OZ/M	June 5			
	Mirage SC (D)	2.0	FL OZ/M	June 17			
	Daconil Ultrex (E)	3.2	OZ/M	July 1			
	Fiata (E)	4.4	FL OZ/M	July 1			
	Primo (E)	0.25	FL OZ/M	July 1	7.0a	5.5abc	3.5b
	Mirage SC (F)	1.0	FL OZ/M	July 16			
	Fiata (H)	4.4	FL OZ/M	July 31			
	Daconil Ultrex (H)	3.2	OZ/M	July 31			
	Primo (H)	0.25	FL OZ/M	July 31			
	Mirage SC (I)	1.0	FL OZ/M	Aug 14			
	Interface (J)	4.0	FL OZ/M	Aug 27			
3	Tartan (A)	2.0	FL OZ/M	May 21			
	Daconil Ultrex (B)	3.2	OZ/M	June 5			
	Fiata (B)	5.9	FL OZ/M	June 5			
	Primo (B)	0.25	FL OZ/M	June 5			
	Mirage SC (D)	2.0	FL OZ/M	June 17			
	Fiata (E)	5.9	FL OZ/M	July 1			
	Daconil Ultrex (E)	3.2	OZ/M	July 1			
	Primo (E)	0.25	FL OZ/M	July 1	7.0a	6.0a	3.8b
	Mirage SC (F)	1.0	FL OZ/M	July 16			
	Fiata (H)	5.9	FL OZ/M	July 31			
	Daconil Ultrex (H)	3.2	OZ/M	July 31			
	Primo (H)	0.25	FL OZ/M	July 31			
	Mirage SC (I)	1.0	FL OZ/M	Aug 14			
	Interface (J)	4.0	FL OZ/M	Aug 27			
4	Tartan (A)	2.0	FL OZ/M	May 21			
	Fiata (B)	4.4	FL OZ/M	June 5			
	Daconil Ultrex (B)	3.2	OZ/M	June 5			
	Primo (B)	0.25	FL OZ/M	June 5			
	Fiata (D)	4.4	FL OZ/M	June 17			
	Mirage SC (D)	2.0	FL OZ/M	June 17			
	Fiata (E)	4.4	FL OZ/M	July 1			
	Daconil Ultrex (E)	3.2	OZ/M	July 1			
	Primo (E)	0.25	FL OZ/M	July 1	7.0a	5.8ab	4.0b
	Fiata (F)	4.4	FL OZ/M	July 16			
	Mirage SC (F)	1.0	FL OZ/M	July 16			
	Fiata (H)	4.4	FL OZ/M	July 31			
	Daconil Ultrex (H)	3.2	OZ/M	July 31			
	Primo (H)	0.25	FL OZ/M	July 31			
	Fiata (I)	4.4	FL OZ/M	Aug 14			
	Mirage SC (I)	1.0	FL OZ/M	Aug 14			
	Interface (J)	4.0	FL OZ/M	Aug 27			

5	Tartan (A)	2.0	FL OZ/M	May 21	7.0a	5.3bc	3.5b
	Fiata (C)	5.9	FL OZ/M	June 12			
	Mirage SC (C)	2.0	FL OZ/M	June 12			
	Primo (C)	0.25	FL OZ/M	June 12			
	Fiata (E)	5.9	FL OZ/M	July 1			
	Chipco 26019 (E)	4.0	FL OZ/M	July 1			
	Fiata (G)	5.9	FL OZ/M	July 23			
	Mirage SC (G)	1.5	FL OZ/M	July 23			
	Primo (G)	0.25	FL OZ/M	July 23			
	Fiata (I)	5.9	FL OZ/M	Aug 14			
	Chipco 26019 (I)	4.0	FL OZ/M	Aug 14			
	Fiata (K)	5.9	FL OZ/M	Sep 4			
	Interface (K)	4.0	FL OZ/M	Sep 4			
Primo (K)	0.25	FL OZ/M	Sep 4				
6	Tartan (A)	2.0	FL OZ/M	May 21	7.0a	5.0c	4.8a
	Fiata (D)	8.8	FL OZ/M	June 17			
	Mirage SC (D)	2.0	FL OZ/M	June 17			
	Daconil Ultrex (D)	3.2	OZ/M	June 17			
	Primo (D)	0.25	FL OZ/M	June 17			
	Fiata (F)	8.8	FL OZ/M	July 16			
	Mirage SC (F)	2.0	FL OZ/M	July 16			
	Daconil Ultrex (F)	3.2	OZ/M	July 16			
	Primo (F)	0.25	FL OZ/M	July 16			
	Fiata (I)	8.8	FL OZ/M	Aug 14			
	Chipco 26019 (I)	4.0	FL OZ/M	Aug 14			
	Daconil Ultrex (I)	3.2	OZ/M	Aug 14			
	Primo (I)	0.25	FL OZ/M	Aug 14			

^bTurfgrass quality was visually assessed on 1-9 scale, with 9 being excellent, 6 being acceptable, and 1 bare dirt. Means followed by the same letter do not significantly differ (P=.05, Waller-Duncan).