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 in Madison, WI on a mixed stand of creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass (*Poa annua*) maintained at a 0.5 inch mowing height. The individual plots measured 3 ft by 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 CO_2 pressurized boom sprayer equipped with two XR Teejet AI8004 VS nozzles. All fungicides were agitated by hand and applied in the equivalent of 1.5 gallons of water per 1000 ft^2. Seven different fungicide programs were initiated on April 27th and May 11th and subsequent applications made every 14, 21, or 28 days. Disease severity (number of dollar spot infection centers per plot) and turfgrass quality (1-9, 9 being excellent, 6 acceptable, and 1 bare soil) were assessed every two weeks. Results were subjected to an analysis of variance and means were separated using the Tukey's Honest Significant Difference 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 the summer, reaching peak levels in mid to late July and into August as non-treated controls averaged 618, 1034, and 633 dollar spot foci per plot on the July 15th, July 29th, and August 13th rating dates, respectively. Disease pressure was moderate in June, and 6 of the 8 treatment programs provided acceptable dollar spot suppression and turfgrass quality. On the July 15th rating date, treatment programs 5 and 8 provided acceptable dollar spot suppression and turfgrass quality despite the high disease pressure. By the August 13th rating date, treatments 6 and 7 also provided acceptable levels of dollar spot suppression and turfgrass quality. 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 2015.

	Treatment	Rate	Application Date	Dollar spot severity[a]		
				Jun 17	Jul 15	Aug 13
1	Non-treated control			153.0a	618.0a	633.8a
2	Bayleton Flo (A)	1.0 FL OZ/1000 FT2	April 27	12.5b	132.0b	233.8bc
	Fiata (B)	5.0 FL OZ/1000 FT2	May 11			
	Primo (B)	0.2 FL OZ/1000 FT2	May 11			
	Mirage (C)	1.5 FL OZ/1000 FT2	May 27			
	Fiata (D)	5.0 FL OZ/1000 FT2	June 9			
	Primo (D)	0.2 FL OZ/1000 FT2	June 9			
	26GT Xtra (E)	3.0 FL OZ/1000 FT2	June 24			
	Fiata (F)	5.0 FL OZ/1000 FT2	July 8			
	Primo (F)	0.2 FL OZ/1000 FT2	July 8			
	26GT Xtra (G)	3.0 FL OZ/1000 FT2	July 22			
	Fiata (H)	5.0 FL OZ/1000 FT2	August 3			
	Primo (H)	0.2 FL OZ/1000 FT2	August 3			
	26GT (I)	4.0 FL OZ/1000 FT2	August 18			
	26GT Xtra (K)	3.0 FL OZ/1000 FT2	September 8			
	Mirage (M)	1.5 FL OZ/1000 FT2	September 29			
3	Bayleton Flo (B)	1.0 FL OZ/1000 FT2	May 11	57.5b	308.3ab	162.8c
	Fiata (D)	5.0 FL OZ/1000 FT2	June 9			
	Primo (D)	0.2 FL OZ/1000 FT2	June 9			
	Mirage (E)	1.5 FL OZ/1000 FT2	June 24			
	Fiata (F)	5.0 FL OZ/1000 FT2	July 8			
	Primo (F)	0.2 FL OZ/1000 FT2	July 8			
	26GT Xtra (G)	3.0 FL OZ/1000 FT2	July 22			
	Mirage (G)	1.5 FL OZ/1000 FT2	July 22			
	Fiata (H)	5.0 FL OZ/1000 FT2	August 3			
	Primo (H)	0.2 FL OZ/1000 FT2	August 3			
	26GT Xtra (I)	3.0 FL OZ/1000 FT2	August 18			
	Fiata (J)	5.0 FL OZ/1000 FT2	September 1			
	Primo (J)	0.2 FL OZ/1000 FT2	September 1			
	26GT Xtra (L)	3.0 FL OZ/1000 FT2	September 22			
	Mirage (N)	1.5 FL OZ/1000 FT2	October 6			
4	Tartan (A)	2.0 FL OZ/1000 FT2	April 27	3.8b	38.0b	208.3bc
	Fiata (B)	4.4 FL OZ/1000 FT2	May 11			
	Daconil Ultrex (B)	3.2 OZ/1000 FT2	May 11			
	Primo (B)	11.0 FL OZ/A	May 11			
	Mirage (D)	1.5 FL OZ/1000 FT2	June 9			
	Daconil Ultrex (E)	3.2 OZ/1000 FT2	June 24			
	Fiata (E)	4.4 FL OZ/1000 FT2	June 24			
	Primo (E)	11.0 FL OZ/A	June 24			
	Mirage (F)	1.0 FL OZ/1000 FT2	July 8			
	Fiata (H)	4.4 FL OZ/1000 FT2	August 3			
	Daconil Ultrex (H)	3.2 OZ/1000 FT2	August 3			
	Primo (H)	11.0 FL OZ/A	August 3			
	Mirage (I)	1.0 FL OZ/1000 FT2	August 18			
	26GT Xtra (J)	4.0 FL OZ/1000 FT2	September 1			
5	Tartan (A)	2.0 FL OZ/1000 FT2	April 27	2.8b	13.3b	172.5c
	Daconil Ultrex (B)	3.2 OZ/1000 FT2	May 11			
	Fiata (B)	5.9 FL OZ/1000 FT2	May 11			
	Primo (B)	11.0 FL OZ/A	May 11			

	Mirage (D)	2.0 FL OZ/1000 FT2	June 9			
	Fiata (E)	5.9 FL OZ/1000 FT2	June 24			
	Daconil Ultrex (E)	3.2 OZ/1000 FT2	June 24			
	Primo (E)	11.0 FL OZ/A	June 24			
	Mirage (F)	1.0 FL OZ/1000 FT2	July 8			
	Fiata (H)	5.9 FL OZ/1000 FT2	August 3			
	Daconil Ultrex (H)	3.2 OZ/1000 FT2	August 3			
	Primo (H)	11.0 FL OZ/A	August 3			
	Mirage (I)	1.0 FL OZ/1000 FT2	August 18			
	26GT Xtra (J)	4.0 FL OZ/1000 FT2	September 1			
	Tartan (A)	2.0 FL OZ/1000 FT2	April 27			
	Fiata (B)	4.4 FL OZ/1000 FT2	May 11			
	Daconil Ultrex (B)	3.2 OZ/1000 FT2	May 11			
	Primo (B)	11.0 FL OZ/A	May 11			
	Fiata (C)	4.4 FL OZ/1000 FT2	May 27			
	Mirage (C)	2.0 FL OZ/1000 FT2	May 27			
	Fiata (D)	4.4 FL OZ/1000 FT2	June 9			
	Daconil Ultrex (D)	3.2 OZ/1000 FT2	June 9			
6	Primo (D)	11.0 FL OZ/A	June 9	0.0b	51.0b	20.8c
	Fiata (E)	4.4 FL OZ/1000 FT2	June 24			
	Mirage (E)	1.0 FL OZ/1000 FT2	June 24			
	Fiata (F)	4.4 FL OZ/1000 FT2	July 8			
	Daconil Ultrex (F)	3.2 OZ/1000 FT2	July 8			
	Primo (F)	11.0 FL OZ/A	July 8			
	Fiata (G)	4.4 FL OZ/1000 FT2	July 22			
	Mirage (G)	1.0 FL OZ/1000 FT2	July 22			
	26GT Xtra (H)	4.0 FL OZ/1000 FT2	August 3			
	Tartan (A)	2.0 FL OZ/1000 FT2	April 27			
	Fiata (C)	5.9 FL OZ/1000 FT2	May 27			
	Mirage (C)	2.0 FL OZ/1000 FT2	May 27			
	Fiata (E)	5.9 FL OZ/1000 FT2	June 24			
	26GT Xtra (E)	4.0 FL OZ/1000 FT2	June 24			
7	Fiata (G)	5.9 FL OZ/1000 FT2	July 22	3.0b	76.3b	3.3c
	Mirage (G)	1.5 FL OZ/1000 FT2	July 22			
	Fiata (H)	5.9 FL OZ/1000 FT2	August 3			
	26GT Xtra (H)	4.0 FL OZ/1000 FT2	August 3			
	Fiata (K)	5.9 FL OZ/1000 FT2	September 8			
	26GT Xtra (K)	4.0 FL OZ/1000 FT2	September 8			
	Tartan (A)	2.0 FL OZ/1000 FT2	April 27			
	Fiata (D)	5.9 FL OZ/1000 FT2	June 9			
	Mirage (D)	2.0 FL OZ/1000 FT2	June 9			
	Daconil Ultrex (D)	3.2 OZ/1000 FT2	June 9			
	Primo (D)	11.0 FL OZ/A	June 9			
	Fiata (F)	5.9 FL OZ/1000 FT2	July 8			
8	Mirage (F)	1.5 FL OZ/1000 FT2	July 8	1.0b	11.5b	477.5ab
	Daconil Ultrex (F)	3.2 OZ/1000 FT2	July 8			
	Primo (F)	11.0 FL OZ/A	July 8			
	Fiata (I)	5.9 FL OZ/1000 FT2	August 18			
	26GT Xtra (I)	4.0 FL OZ/1000 FT2	August 18			
	Daconil Ultrex (I)	3.2 OZ/1000 FT2	August 18			
	Primo (I)	11.0 FL OZ/A	August 18			

[a]Dollar 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, Tukey's HSD).

Table 2. Mean turf quality ratings per treatment at the O. J. Noer Turfgrass Research and Education Facility in Madison, WI in 2015.

	Treatment	Rate	Application Date	Turfgrass Quality[b]		
				Jun 17	Jul 15	Aug 13
1	Non-treated control			4.5b	2.5c	3.5d
2	Bayleton Flo (A)	1.0 FL OZ/1000 FT2	April 27	6.3a	4.3b	5.0b
	Fiata (B)	5.0 FL OZ/1000 FT2	May 11			
	Primo (B)	0.2 FL OZ/1000 FT2	May 11			
	Mirage (C)	1.5 FL OZ/1000 FT2	May 27			
	Fiata (D)	5.0 FL OZ/1000 FT2	June 9			
	Primo (D)	0.2 FL OZ/1000 FT2	June 9			
	26GT Xtra (E)	3.0 FL OZ/1000 FT2	June 24			
	Fiata (F)	5.0 FL OZ/1000 FT2	July 8			
	Primo (F)	0.2 FL OZ/1000 FT2	July 8			
	26GT Xtra (G)	3.0 FL OZ/1000 FT2	July 22			
	Fiata (H)	5.0 FL OZ/1000 FT2	August 3			
	Primo (H)	0.2 FL OZ/1000 FT2	August 3			
	26GT (I)	4.0 FL OZ/1000 FT2	August 18			
	26GT Xtra (K)	3.0 FL OZ/1000 FT2	September 8			
	Mirage (M)	1.5 FL OZ/1000 FT2	September 29			
3	Bayleton Flo (B)	1.0 FL OZ/1000 FT2	May 11	5.0b	3.8bc	5.0b
	Fiata (D)	5.0 FL OZ/1000 FT2	June 9			
	Primo (D)	0.2 FL OZ/1000 FT2	June 9			
	Mirage (E)	1.5 FL OZ/1000 FT2	June 24			
	Fiata (F)	5.0 FL OZ/1000 FT2	July 8			
	Primo (F)	0.2 FL OZ/1000 FT2	July 8			
	26GT Xtra (G)	3.0 FL OZ/1000 FT2	July 22			
	Mirage (G)	1.5 FL OZ/1000 FT2	July 22			
	Fiata (H)	5.0 FL OZ/1000 FT2	August 3			
	Primo (H)	0.2 FL OZ/1000 FT2	August 3			
	26GT Xtra (I)	3.0 FL OZ/1000 FT2	August 18			
	Fiata (J)	5.0 FL OZ/1000 FT2	September 1			
	Primo (J)	0.2 FL OZ/1000 FT2	September 1			
	26GT Xtra (L)	3.0 FL OZ/1000 FT2	September 22			
	Mirage (N)	1.5 FL OZ/1000 FT2	October 6			
4	Tartan (A)	2.0 FL OZ/1000 FT2	April 27	7.0a	5.3ab	4.8bc
	Fiata (B)	4.4 FL OZ/1000 FT2	May 11			
	Daconil Ultrex (B)	3.2 OZ/1000 FT2	May 11			
	Primo (B)	11.0 FL OZ/A	May 11			
	Mirage (D)	1.5 FL OZ/1000 FT2	June 9			
	Daconil Ultrex (E)	3.2 OZ/1000 FT2	June 24			
	Fiata (E)	4.4 FL OZ/1000 FT2	June 24			
	Primo (E)	11.0 FL OZ/A	June 24			
	Mirage (F)	1.0 FL OZ/1000 FT2	July 8			
	Fiata (H)	4.4 FL OZ/1000 FT2	August 3			
	Daconil Ultrex (H)	3.2 OZ/1000 FT2	August 3			
	Primo (H)	11.0 FL OZ/A	August 3			
	Mirage (I)	1.0 FL OZ/1000 FT2	August 18			
	26GT Xtra (J)	4.0 FL OZ/1000 FT2	September 1			
5	Tartan (A)	2.0 FL OZ/1000 FT2	April 27	7.0a	6.3a	5.0b
	Daconil Ultrex (B)	3.2 OZ/1000 FT2	May 11			
	Fiata (B)	5.9 FL OZ/1000 FT2	May 11			
	Primo (B)	11.0 FL OZ/A	May 11			

	Mirage (D)	2.0 FL OZ/1000 FT2	June 9			
	Fiata (E)	5.9 FL OZ/1000 FT2	June 24			
	Daconil Ultrex (E)	3.2 OZ/1000 FT2	June 24			
	Primo (E)	11.0 FL OZ/A	June 24			
	Mirage (F)	1.0 FL OZ/1000 FT2	July 8			
	Fiata (H)	5.9 FL OZ/1000 FT2	August 3			
	Daconil Ultrex (H)	3.2 OZ/1000 FT2	August 3			
	Primo (H)	11.0 FL OZ/A	August 3			
	Mirage (I)	1.0 FL OZ/1000 FT2	August 18			
	26GT Xtra (J)	4.0 FL OZ/1000 FT2	September 1			
	Tartan (A)	2.0 FL OZ/1000 FT2	April 27			
	Fiata (B)	4.4 FL OZ/1000 FT2	May 11			
	Daconil Ultrex (B)	3.2 OZ/1000 FT2	May 11			
	Primo (B)	11.0 FL OZ/A	May 11			
	Fiata (C)	4.4 FL OZ/1000 FT2	May 27			
	Mirage (C)	2.0 FL OZ/1000 FT2	May 27			
	Fiata (D)	4.4 FL OZ/1000 FT2	June 9			
	Daconil Ultrex (D)	3.2 OZ/1000 FT2	June 9			
6	Primo (D)	11.0 FL OZ/A	June 9	7.0a	5.0ab	6.5a
	Fiata (E)	4.4 FL OZ/1000 FT2	June 24			
	Mirage (E)	1.0 FL OZ/1000 FT2	June 24			
	Fiata (F)	4.4 FL OZ/1000 FT2	July 8			
	Daconil Ultrex (F)	3.2 OZ/1000 FT2	July 8			
	Primo (F)	11.0 FL OZ/A	July 8			
	Fiata (G)	4.4 FL OZ/1000 FT2	July 22			
	Mirage (G)	1.0 FL OZ/1000 FT2	July 22			
	26GT Xtra (H)	4.0 FL OZ/1000 FT2	August 3			
	Tartan (A)	2.0 FL OZ/1000 FT2	April 27			
	Fiata (C)	5.9 FL OZ/1000 FT2	May 27			
	Mirage (C)	2.0 FL OZ/1000 FT2	May 27			
	Fiata (E)	5.9 FL OZ/1000 FT2	June 24			
	26GT Xtra (E)	4.0 FL OZ/1000 FT2	June 24			
7	Fiata (G)	5.9 FL OZ/1000 FT2	July 22	7.0a	4.5b	7.0a
	Mirage (G)	1.5 FL OZ/1000 FT2	July 22			
	Fiata (H)	5.9 FL OZ/1000 FT2	August 3			
	26GT Xtra (H)	4.0 FL OZ/1000 FT2	August 3			
	Fiata (K)	5.9 FL OZ/1000 FT2	September 8			
	26GT Xtra (K)	4.0 FL OZ/1000 FT2	September 8			
	Tartan (A)	2.0 FL OZ/1000 FT2	April 27			
	Fiata (D)	5.9 FL OZ/1000 FT2	June 9			
	Mirage (D)	2.0 FL OZ/1000 FT2	June 9			
	Daconil Ultrex (D)	3.2 OZ/1000 FT2	June 9			
	Primo (D)	11.0 FL OZ/A	June 9			
	Fiata (F)	5.9 FL OZ/1000 FT2	July 8			
8	Mirage (F)	1.5 FL OZ/1000 FT2	July 8	7.0a	6.3a	4.0cd
	Daconil Ultrex (F)	3.2 OZ/1000 FT2	July 8			
	Primo (F)	11.0 FL OZ/A	July 8			
	Fiata (I)	5.9 FL OZ/1000 FT2	August 18			
	26GT Xtra (I)	4.0 FL OZ/1000 FT2	August 18			
	Daconil Ultrex (I)	3.2 OZ/1000 FT2	August 18			
	Primo (I)	11.0 FL OZ/A	August 18			

[b]Turfgrass 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, Tukey's HSD).