



## Dollar Spot Suppression on Golf Course Putting Greens

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### OBJECTIVE

To determine the efficacy of standard and experimental fungicides for controlling dollar spot caused by the fungus *Clarireedia* spp. on a creeping bentgrass putting green.

### MATERIALS AND METHODS

The study was conducted at the O. J. Noer Turfgrass Research and Education Facility on a stand of 'Pennncross' creeping bentgrass (*Agrostis stolonifera*) maintained at 0.125 inches. Individual plots measured 3 feet by 5 feet and were arranged in a randomized complete block design with four replications. Treatments were applied at a nozzle pressure of 40 psi using a CO<sub>2</sub>-pressurized boom sprayer equipped with two Teejet AI8004 VS nozzles. All fungicides were agitated by hand and applied in the equivalent of 1.5 gallons of water per 1000 ft<sup>2</sup>. All treatments were initiated on May 23<sup>rd</sup> and subsequent applications were made at 14- or 21-day intervals. Number of dollar spot foci per plot and turfgrass quality (1-9, 9 being excellent, 6 acceptable, and 1 bare soil) were visually assessed every 2 weeks. Turf quality and disease severity were subjected to an analysis of variance and means separated using Fisher's LSD ( $P = 0.05$ ). Results of disease severity and turfgrass quality ratings can be found in Table 1 and 2, respectively.

### RESULTS AND DISCUSSION

Dollar spot pressure was moderate to high throughout the summer, and the highest pressure was recorded during the Aug 7<sup>th</sup> rating date with nearly 75 dollar spot foci per plot in the non-treated control. Despite the high pressure on this date, 17 of the 31 fungicide treatments provided 100% disease control and an additional 10 treatments provided statistically similar control to the treatments that provided complete control. This means that a full 27 of 31 fungicide treatments (87%) provided excellent dollar spot control under high disease pressure. Turf quality mostly mirrored disease severity and 24 of 31 fungicide treatments provided acceptable turf quality (>6) on the Aug 7<sup>th</sup> rating date. Similar results were observed during the Jul 25<sup>th</sup> and Aug 21<sup>st</sup> rating dates. No phytotoxicity was observed with any of the treatments.

**Table 1. Mean number of dollar spots per treatment at greens height at the OJ Noer Turfgrass Research Facility in Madison, WI during 2019.**

Treatment		Rate	Application Interval	Application Code <sup>b</sup>	Dollar Spot Severity <sup>a</sup>		
					Jul 25	Aug 7	Aug 21
1	Non-treated control				46.0 ab	74.3 b	52.8 b
2	Velista	0.5 OZ/1000 FT2	14 Day	B	3.5 fgh	0.0e	0.0h
	Secure Action	0.5 FL OZ/1000 FT2		BHL			
	Appear II	6.0 FL OZ/1000 FT2		BDFHJLN			
	Daconil Action	3.5 FL OZ/1000 FT2		DHL			
	Heritage Action	0.2 OZ/1000 FT2		D			
	Briskway	0.5 FL OZ/1000 FT2		FJN			
3	Velista	0.5 OZ/1000 FT2	14 Day	B	15.5 d-g	0.8e	0.0h
	Secure Action	0.5 FL OZ/1000 FT2		BHL			
	Signature Xtra	4.0 OZ/1000 FT2		BDFHJLN			
	Daconil Action	3.5 FL OZ/1000 FT2		DHL			
	Heritage Action	0.2 OZ/1000 FT2		D			
	Briskway	0.5 FL OZ/1000 FT2		FJN			
4	Velista	0.5 OZ/1000 FT2	14 Day	B	5.5 fgh	0.0e	1.3 gh
	Secure Action	0.5 FL OZ/1000 FT2		BHL			
	Daconil Action	3.5 FL OZ/1000 FT2		DHL			
	Heritage Action	0.2 OZ/1000 FT2		D			
	Briskway	0.5 FL OZ/1000 FT2		FJN			
5	QP Propiconazole	0.82 FL OZ/1000 FT2	21 day	BEHKN	13.0e-h	2.5 e	12.0d-h
6	Strobe	0.144 OZ/1000 FT2	21 day	BEHKN	32.5 bc	58.0b	45.0b
7	TM 4.5	1.86 FL OZ/1000 FT2	21 day	BEHKN	50.3 a	111.5 a	85.3 a
8	Allegro	5.03 FL OZ/1000 FT2	21 day	BEHKN	0.0h	0.0e	0.0h
9	QP Propiconazole	0.82 FL OZ/1000 FT2	21 day	BEHKN	11.8 e-h	3.3 e	9.5 e-h
	TM 4.5	1.86 FL OZ/1000 FT2					
10	QP Propiconazole	0.82 FL OZ/1000 FT2	21 day	BEHKN	0.0h	0.0e	0.0h
	Allegro	5.03 FL OZ/1000 FT2					
11	QP Propiconazole	0.82 FL OZ/1000 FT2	21 day	BEHKN	4.5 fgh	1.0e	6.0 gh
	TM 4.5	1.86 FL OZ/1000 FT2		BEHKN			
	Strobe	0.144 OZ/1000 FT2		BEHKN			
12	TM 4.5	1.86 FL OZ/1000 FT2	21 day	BEHKN	0.0h	0.0e	0.0h
	Allegro	5.03 FL OZ/1000 FT2		BEHKN			
13	TM 4.5	1.86 FL OZ/1000 FT2	21 day	BEHKN	0.0h	0.0e	0.0h
	Allegro	5.03 FL OZ/1000 FT2		BEHKN			
	Strobe	0.144 OZ/1000 FT2		BEHKN			
14	QP Propiconazole	0.82 FL OZ/1000 FT2	21 day	BEHKN	0.0h	0.0e	0.0h
	Allegro	5.03 FL OZ/1000 FT2		BEHKN			
	Strobe	0.144 OZ/1000 FT2		BEHKN			
LSD P=.05					13.64	21.01	16.75

<sup>a</sup>Dollar spot rated as number of dollar spot infection centers. Means followed by the same letter do not significantly differ (P=.05, Fisher's LSD).

<sup>b</sup>Application Code B = May 23rd, D = June 5th, E = June 11th, F = June 19th, H = July 2nd, J = July 17th, K = July 24th, L = July 31st, N = August 14th

**Table 1 (cont). Mean number of dollar spots per treatment at greens height at the OJ Noer Turfgrass Research Facility in Madison, WI during 2019.**

	Treatment	Rate	Application Interval	Application Code <sup>b</sup>	Dollar Spot Severity <sup>a</sup>		
					Jul 25	Aug 7	Aug 21
15	AzProp Select	1.5 FL OZ/1000 FT2	14 day	B	6.5 fgh	0.0 e	1.0 gh
	Trin-Pac Select	0.125 FL OZ/1000 FT2		BFJN			
	Tee Time Select	0.45 FL OZ/1000 FT2		BDFHJLN			
	Azoxystrobin Select	0.77 FL OZ/1000 FT2		DJ			
	Chlorothalonil Select	3.25 FL OZ/1000 FT2		DFJ			
	TM 4.5F Select	3.0 FL OZ/1000 FT2		F			
	Fluazinam40SCSelect	0.5 FL OZ/1000 FT2		HL			
	Fosetyl Select	4.0 OZ/1000 FT2		HL			
16	Iprodione 2F Select	3.5 FL OZ/1000 FT2	14 day	N	4.3 fgh	7.3 de	5.0 gh
	AzTeb Select	1.5 FL OZ/1000 FT2		B			
	Trin-Pac Select	0.125 FL OZ/1000 FT2		BFJN			
	Tee Time Select	0.45 FL OZ/1000 FT2		BDFHJLN			
	Azoxystrobin Select	0.77 FL OZ/1000 FT2		DJ			
	Fluazinam40SCSelect	0.5 FL OZ/1000 FT2		DFJ			
	TM 4.5F Select	3.0 FL OZ/1000 FT2		F			
	Chlorothalonil Select	3.25 OZ/1000 FT2		HL			
17	Fosetyl Select	4.0 OZ/1000 FT2	14 day	HL	11.3 e-h	31.3 c	7.5 fgh
	Iprodione 2F Select	3.5 FL OZ/1000 FT2		N			
	Fairview Select	0.5 FL OZ/1000 FT2		B			
	Fosetyl Select	4.0 OZ/1000 FT2		BJ			
	Trin-Pac Select	0.125 FL OZ/1000 FT2		BFJN			
	Tee Time Select	0.45 FL OZ/1000 FT2		BDFHJLN			
	Chlorothalonil Select	3.25 OZ/1000 FT2		DHJN			
	Azoxystrobin Select	0.77 FL OZ/1000 FT2		D			
18	Iprodione 2F Select	3.5 FL OZ/1000 FT2	14 day	FN	4.0 fgh	1.0 e	0.8 gh
	TM 4.5F Select	3.0 FL OZ/1000 FT2		FN			
19	Secure	0.5 FL OZ/1000 FT2	14 day	BDFHJLN	3.8 fgh	2.0 e	2.8 gh
20	Fairview Select	1.3 FL OZ/1000 FT2	14 day	BDFHJLN	1.5 h	0.0 e	0.0 h
21	Traction	1.3 FL OZ/1000 FT2	14 day	BDFHJLN	1.5 h	0.0 e	0.0 h
22	Fluazinam40SCSelect	0.5 FL OZ/1000 FT2	14 day	BDFHJLN	3.0 gh	0.0 e	0.0 h
	BSK-101	0.59 FL OZ/1000 FT2		BDFHJLN			
23	Fairview Select	1.3 FL OZ/1000 FT2	14 day	BDFHJLN	0.8 h	0.0 e	0.0 h
	BSK-101	0.59 FL OZ/1000 FT2		BDFHJLN			
24	Enclave	4.0 FL OZ/1000 FT2	21 day	BEHKN	12.8 e-h	20.0 cde	8.8 e-h
	Foursome	0.4 FL OZ/1000 FT2		BEHKN			
25	Xzemplar	0.16 FL OZ/1000 FT2	14 day	BDFHJLN	1.8 h	0.5 e	0.8 gh
26	A13703 [G]	0.5 FL OZ/1000 FT2	14 day	BDFHJLN	26.8 cd	28.0 cd	25.3 cde
LSD P=.05					13.64	21.01	16.75

<sup>a</sup>Dollar spot rated as number of dollar spot infection centers. Means followed by the same letter do not significantly differ (P=.05, Fisher's LSD).

<sup>b</sup>Application Code B = May 23rd, D = June 5th, E = June 11th, F = June 19th, H = July 2nd, J = July 17th, K = July 24th, L = July 31st, N = August 14th

**Table 1 (cont). Mean number of dollar spots per treatment at greens height at the OJ Noer Turfgrass Research Facility in Madison, WI during 2019.**

Treatment	Rate	Application Interval	Application Code <sup>b</sup>	Dollar Spot Severity <sup>a</sup>		
				Jul 25	Aug 7	Aug 21
27 A13703 [G]	0.725 FL OZ/1000 FT2	14 day	BDFHJLN	17.0 def	10.5 cde	17.0 d-g
28 A13703 [G]	0.9 FL OZ/1000 FT2	14 day	BDFHJLN	6.3 fgh	0.0 e	9.3 e-h
29 A13703 [G]	1.2 FL OZ/1000 FT2	14 day	BDFHJLN	1.0 h	0.0 e	3.8 gh
30	A19649 [B]	14 day	BDFHJLN	0.0 h	0.0 e	0.0 h
	A15457 [R]		BDFHJLN			
	A7087 [F]		BDFHJLN			
	A9180 [A]		BDFHJLN			
31	A19649 [B]	14 day	BDFHJLN	0.0 h	0.0 e	0.0 h
	A15457 [R]		BDFHJLN			
	A7087 [F]		BDFHJLN			
	A9180 [A]		BDFHJLN			
32 A20744 [D]	0.5 OZ/1000 FT2	14 day	BDFHJLN	0.0 h	0.0 e	0.0 h
LSD P=.05				13.64	21.01	16.75

<sup>a</sup>Dollar spot rated as number of dollar spot infection centers. Means followed by the same letter do not significantly differ (P=.05, Fisher's LSD).

<sup>b</sup>Application Code B = May 23rd, D = June 5th, E = June 11th, F = June 19th, H = July 2nd, J = July 17th, K = July 24th, L = July 31st, N = August 14th

**Table 2. Mean turfgrass quality per treatment at greens height at the OJ Noer Turfgrass Research Facility in Madison, WI during 2019.**

Treatment		Rate	Application Interval	Application Code <sup>b</sup>	Turfgrass Quality <sup>a</sup>		
					Jul 24	Aug 7	Aug 21
1	Non-treated control				5.0 g	4.0 k	4.0 g
2	Velista	0.5 OZ/1000 FT2	14 Day	B	6.8 ab	7.8 a	7.0 a
	Secure Action	0.5 FL OZ/1000 FT2		BHL			
	Appear II	6.0 FL OZ/1000 FT2		BDFHJLN			
	Daconil Action	3.5 FL OZ/1000 FT2		DHL			
	Heritage Action	0.2 OZ/1000 FT2		D			
	Briskway	0.5 FL OZ/1000 FT2		FJN			
3	Velista	0.5 OZ/1000 FT2	14 Day	B	5.8 def	7.3 abc	7.0 a
	Secure Action	0.5 FL OZ/1000 FT2		BHL			
	Signature Xtra	4.0 OZ/1000 FT2		BDFHJLN			
	Daconil Action	3.5 FL OZ/1000 FT2		DHL			
	Heritage Action	0.2 OZ/1000 FT2		D			
	Briskway	0.5 FL OZ/1000 FT2		FJN			
4	Velista	0.5 OZ/1000 FT2	14 Day	B	6.3 bcd	6.8 b-e	6.0 bc
	Secure Action	0.5 FL OZ/1000 FT2		BHL			
	Daconil Action	3.5 FL OZ/1000 FT2		DHL			
	Heritage Action	0.2 OZ/1000 FT2		D			
	Briskway	0.5 FL OZ/1000 FT2		FJN			
5	QP Propiconazole	0.82 FL OZ/1000 FT2	21 day	BEHKN	5.3 fg	5.8 f-i	5.0 e
6	Strobe	0.144 OZ/1000 FT2	21 day	BEHKN	5.0 g	4.5 jk	4.0 g
7	TM 4.5	1.86 FL OZ/1000 FT2	21 day	BEHKN	5.0 g	4.5 jk	4.3 fg
8	Allegro	5.03 FL OZ/1000 FT2	21 day	BEHKN	7.0 a	7.3 abc	7.0 a
9	QP Propiconazole	0.82 FL OZ/1000 FT2	21 day	BEHKN	5.3 fg	6.0 e-h	5.0 e
	TM 4.5	1.86 FL OZ/1000 FT2					
10	QP Propiconazole	0.82 FL OZ/1000 FT2	21 day	BEHKN	7.0 a	7.3 abc	7.0 a
	Allegro	5.03 FL OZ/1000 FT2					
11	QP Propiconazole	0.82 FL OZ/1000 FT2	21 day	BEHKN	6.0 cde	6.8 b-e	6.0 bc
	TM 4.5	1.86 FL OZ/1000 FT2		BEHKN			
	Strobe	0.144 OZ/1000 FT2		BEHKN			
12	TM 4.5	1.86 FL OZ/1000 FT2	21 day	BEHKN	7.0 a	7.5 ab	7.0 a
	Allegro	5.03 FL OZ/1000 FT2		BEHKN			
13	TM 4.5	1.86 FL OZ/1000 FT2	21 day	BEHKN	7.0 a	7.0 a-d	7.0 a
	Allegro	5.03 FL OZ/1000 FT2		BEHKN			
	Strobe	0.144 OZ/1000 FT2		BEHKN			
14	QP Propiconazole	0.82 FL OZ/1000 FT2	21 day	BEHKN	7.0 a	7.0 a-d	7.0 a
	Allegro	5.03 FL OZ/1000 FT2		BEHKN			
	Strobe	0.144 OZ/1000 FT2		BEHKN			
LSD P=.05					0.73	0.8	0.7

<sup>a</sup>Turfgrass quality was rated visually on a 1 – 9 scale with 6 being acceptable. Means followed by the same letter do not significantly differ (P=.05, Fisher's LSD).

<sup>b</sup>Application Code B = May 23rd, D = June 5th, E = June 11th, F = June 19th, H = July 2nd, J = July 17th, K = July 24th, L = July 31st, N = August 14th

**Table 2 (cont). Mean turfgrass quality per treatment at greens height at the OJ Noer Turfgrass Research Facility in Madison, WI during 2019.**

	Treatment	Rate	Application Interval	Application Code <sup>b</sup>	Turfgrass Quality <sup>a</sup>		
					Jul 24	Aug 7	Aug 21
15	AzProp Select	1.5 FL OZ/1000 FT2	14 day	B	6.0 cde	7.3 abc	6.5 ab
	Trin-Pac Select	0.125 FL OZ/1000 FT2		BFJN			
	Tee Time Select	0.45 FL OZ/1000 FT2		BDFHJLN			
	Azoxystrobin Select	0.77 FL OZ/1000 FT2		DJ			
	Chloro 720 Select	3.25 FL OZ/1000 FT2		DFJ			
	TM 4.5F Select	3.0 FL OZ/1000 FT2		F			
	Fluazifluorfen Select	0.5 FL OZ/1000 FT2		HL			
	Foslate Select	4.0 OZ/1000 FT2		HL			
16	Iprodione 2F Select	3.5 FL OZ/1000 FT2	14 day	N	6.3 bcd	6.3 d-g	5.8 cd
	AzTeb Select	1.5 FL OZ/1000 FT2		B			
	Trin-Pac Select	0.125 FL OZ/1000 FT2		BFJN			
	Tee Time Select	0.45 FL OZ/1000 FT2		BDFHJLN			
	Azoxystrobin Select	0.77 FL OZ/1000 FT2		DJ			
	Fluazifluorfen Select	0.5 FL OZ/1000 FT2		DFJ			
	TM 4.5F Select	3.0 FL OZ/1000 FT2		F			
	Chloro 82.5DF Select	3.25 OZ/1000 FT2		HL			
17	Foslate Select	4.0 OZ/1000 FT2	14 day	HL	5.5 efg	5.3 hij	5.3 de
	Iprodione 2F Select	3.5 FL OZ/1000 FT2		N			
	Fairview Select	0.5 FL OZ/1000 FT2		B			
	Foslate Select	4.0 OZ/1000 FT2		BJ			
	Trin-Pac Select	0.125 FL OZ/1000 FT2		BFJN			
	Tee Time Select	0.45 FL OZ/1000 FT2		BDFHJLN			
	Chloro 82.5DF Select	3.25 OZ/1000 FT2		DHJN			
	Azoxystrobin Select	0.77 FL OZ/1000 FT2		D			
18	Iprodione 2F Select	3.5 FL OZ/1000 FT2	14 day	FN	6.3 bcd	6.5 c-f	6.5 ab
	TM 4.5F Select	3.0 FL OZ/1000 FT2		FN			
19	Secure	0.5 FL OZ/1000 FT2	14 day	BDFHJLN	6.3 bcd	6.5 c-f	5.8 cd
20	Fairview Select	1.3 FL OZ/1000 FT2	14 day	BDFHJLN	6.8 ab	7.0 a-d	6.8 a
21	Traction	1.3 FL OZ/1000 FT2	14 day	BDFHJLN	6.8 ab	7.0 a-d	7.0 a
22	Fluazifluorfen Select	0.5 FL OZ/1000 FT2	14 day	BDFHJLN	6.5 abc	6.8 b-e	6.5 ab
	BSK-101	0.59 FL OZ/1000 FT2		BDFHJLN			
23	Fairview Select	1.3 FL OZ/1000 FT2	14 day	BDFHJLN	7.0 a	7.0 a-d	7.0 a
	BSK-101	0.59 FL OZ/1000 FT2		BDFHJLN			
24	Enclave	4.0 FL OZ/1000 FT2	21 day	BEHKN	5.3 fg	5.3 hij	5.3 de
	Foursome	0.4 FL OZ/1000 FT2		BEHKN			
25	Xzemplar	0.16 FL OZ/1000 FT2	14 day	BDFHJLN	6.8 ab	6.8 b-e	6.5 ab
26	A13703 [G]	0.5 FL OZ/1000 FT2	14 day	BDFHJLN	5.3 fg	5.5 ghi	5.0 e
LSD P=.05					0.73	0.8	0.7

<sup>a</sup>Turfgrass quality was rated visually on a 1 – 9 scale with 6 being acceptable. Means followed by the same letter do not significantly differ (P=.05, Fisher's LSD).

<sup>b</sup>Application Code B = May 23rd, D = June 5th, E = June 11th, F = June 19th, H = July 2nd, J = July 17th, K = July 24th, L = July 31st, N = August 14th

**Table 2 (cont). Mean turfgrass quality per treatment at greens height at the OJ Noer Turfgrass Research Facility in Madison, WI during 2019.**

Treatment	Rate	Application Interval	Application Code <sup>b</sup>	Turfgrass Quality <sup>a</sup>		
				Jul 24	Aug 7	Aug 21
27 A13703 [G]	0.725 FL OZ/1000 FT2	14 day	BDFHJLN	5.3 fg	5.8 f-i	5.0 e
28 A13703 [G]	0.9 FL OZ/1000 FT2	14 day	BDFHJLN	6.0 cde	6.8 b-e	5.0 e
29 A13703 [G]	1.2 FL OZ/1000 FT2	14 day	BDFHJLN	6.8 ab	7.0 a-d	6.0 bc
30	A19649 [B]	14 day	BDFHJLN	7.0 a	7.3 abc	7.0 a
	A15457 [R]		BDFHJLN			
	A7087 [F]		BDFHJLN			
	A9180 [A]		BDFHJLN			
31	A19649 [B]	14 day	BDFHJLN	7.0 a	7.3 abc	7.0 a
	A15457 [R]		BDFHJLN			
	A7087 [F]		BDFHJLN			
	A9180 [A]		BDFHJLN			
32 A20744 [D]	0.5 OZ/1000 FT2	14 day	BDFHJLN	7.0 a	7.3 abc	6.8 a
LSD P=.05				0.73	0.8	0.7

<sup>a</sup>Turfgrass quality was rated visually on a 1 – 9 scale with 6 being acceptable. Means followed by the same letter do not significantly differ (P=.05, Fisher's LSD).

<sup>b</sup>Application Code B = May 23rd, D = June 5th, E = June 11th, F = June 19th, H = July 2nd, J = July 17th, K = July 24th, L = July 31st, N = August 14th