

Snowmold Chemistry Test Trials

What Worked the Winter of 2012-2013 and What Didn't

Research trials were held at 6 sites across the Midwest: OJ Noer Turfgrass Research Center in Madison, WI; Odana Hills GC in Madison, WI; Sentryworld GC in Stevens Point, WI; Wawonowin Country Club in Champion, MI; Les Bolstad GC in St Paul, MN; and The Legacy at Craguns Resort in Brainerd, MN. In addition, small 'Auxiliary' research trials were also held at 3 sites in Wisconsin and Michigan. Only two trials, Craguns and Wawonowin were used in this article as they had high disease pressure.

The MGCSA appreciates the efforts of the University of Wisconsin and the Turf Diagnostics Lab, and credits them with the contents of the presented studies. We are in debt to Dr. Koch, his colleagues and the courses where the studies took place. Thank you to Dr. Brian Horgan and his team of turf professionals for their contributions to the project.





2012-2013 Snow Mold Control Evaluation Craguns Golf Resort – Brainerd, MN



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OBJECTIVES

To evaluate fungicides for the control of Typhula blight (caused by *Typhula ishikariensis* and *T. incarnata*) and Microdochium patch (caused by *Microdochium nivale*).

MATERIALS AND METHODS

This evaluation was conducted at The Legacy at Craguns GC in Brainerd, MN on a creeping bentgrass (*Agrostis stolonifera*) golf course fairway maintained at a height of 0.5 inch. Individual plots measured 3 ft x 10 ft (30 ft²), 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, with the exception of the granular product Pillar G. Early applications were made on October 16th, 2012 and late applications were made on November 7th, 2012. The experimental plot area was not inoculated. Snow cover persisted on the experimental area from mid-December to late April, a period of approximately 160 days. Disease severity, turf quality, and turf color were recorded on May 9th, 2013. Disease severity was visually rated as percent area affected, turfgrass quality was visually rated on a 1-9 scale with 6 being acceptable, Normalized Difference Vegetative Index (turfgrass color) was rated using an NDVI Turf Color Meter® from Spectrum Technologies. Data was subjected to an analysis of variance and means were separated using the Waller-Duncan test. Means for disease severity, turf quality and turf color for individual treatments are presented in the following table.

RESULTS AND DISCUSSION

Disease pressure was moderate Craguns with non-treated controls averaging 21% disease. The primary pathogen causing disease was *Typhula ishikariensis*. All treatments reduced disease compared to the non-treated control except treatment 2. Only seven treatments failed to provide acceptable snow mold suppression ($\leq 5\%$ disease). Most treatments providing acceptable disease control contained 3 or more active ingredients in the application. Turfgrass quality mirrored disease severity, with most treatments providing acceptable turfgrass quality. No differences in turf color were observed by the NDVI meter.

Table 1 (cont): Mean snow mold severity, turf quality, and turf color assessed on May 9th, 2013 at The Legacy at Craguns GC in Brainerd, MN.

	Treatment	Rate	Application Timing ^a	Disease Severity ^b	Turf Quality ^c	Turf Color ^d
38	Civitas Harmonizer Torque	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 0.6 FL OZ/1000 FT2	Early/Late Early/Late Early/Late	0.0f	8.0a	0.644a
39	Civitas Harmonizer Torque Chipco 26GT	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 0.6 FL OZ/1000 FT2 4.0 FL OZ/1000 FT2	Early/Late Early/Late Early Late	0.0f	7.8ab	0.632a
40	Civitas Harmonizer Trinity Trinity	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 1.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Early/Late Early/Late Early Late	0.0f	7.8ab	0.630a
41	Civitas Harmonizer Daconil Ultrex Chipco 26GT	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 5.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2	Early/Late Early/Late Late Late	6.3def	7.0b-e	0.635a
42	Civitas Harmonizer Concert II	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 5.5 FL OZ/1000 FT2	Early/Late Early/Late Late	0.0f	7.8ab	0.648a
43	Civitas Harmonizer Instrata	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 5.5 FL OZ/1000 FT2	Early/Late Early/Late Late	0.0f	7.8ab	0.631a
44	Civitas Harmonizer Chipco 26GT Daconil Action	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 4.0 FL OZ/1000 FT2 5.4 FL OZ/1000 FT2	Early/Late Early/Late Late Late	5.0def	6.3e-h	0.616a
45	Civitas Harmonizer	14.5 FL OZ/1000 FT2 4.0 FL OZ/1000 FT2	Early/Late Early/Late	16.3bc	5.5hij	0.629a
46	QP TM/C QP Iprodione QP Propiconazole Foursome	6.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2 2.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late Late	0.0f	7.5abc	0.633a
47	QP TM/C QP Iprodione QP Tebuconazole Foursome	6.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2 0.6 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late Late	0.0f	7.5abc	0.635a
48	QP Iprodione QP Tebuconazole Foursome	4.0 FL OZ/1000 FT2 1.1 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late	0.0f	7.5abc	0.631a
49	QP Enclave Foursome	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late	0.0f	7.5abc	0.636a
50	Turfcide 400	10.0 FL OZ/1000 FT2	Late	0.0f	6.8c-f	0.612a

^aEarly fungicide treatments applied on Oct. 16th, 2012 and late treatments applied on Nov. 7th, 2012.

^bMean percent diseased area assessed on May 9th, 2013.

^cQuality was visually assessed where 1 = dead, 6 = acceptable, 9 = dark green.

^dColor was assessed using a TCM 500 NDVI Turf Color Meter from Spectrum Technologies®.

Table 1 (cont): Mean snow mold severity, turf quality, and turf color assessed on May 9th, 2013 at The Legacy at Craguns GC in Brainerd, MN.

	Treatment	Rate	Application Timing ^a	Disease Severity ^b	Turf Quality ^c	Turf Color ^d
38	Civitas	8.0 FL OZ/1000 FT2	Early/Late	0.0f	8.0a	0.644a
	Harmonizer	0.5 FL OZ/1000 FT2	Early/Late			
	Torque	0.6 FL OZ/1000 FT2	Early/Late			
39	Civitas	8.0 FL OZ/1000 FT2	Early/Late	0.0f	7.8ab	0.632a
	Harmonizer	0.5 FL OZ/1000 FT2	Early/Late			
	Torque	0.6 FL OZ/1000 FT2	Early			
	Chipco 26GT	4.0 FL OZ/1000 FT2	Late			
40	Civitas	8.0 FL OZ/1000 FT2	Early/Late	0.0f	7.8ab	0.630a
	Harmonizer	0.5 FL OZ/1000 FT2	Early/Late			
	Trinity	1.0 FL OZ/1000 FT2	Early			
	Trinity	0.5 FL OZ/1000 FT2	Late			
41	Civitas	8.0 FL OZ/1000 FT2	Early/Late	6.3def	7.0b-e	0.635a
	Harmonizer	0.5 FL OZ/1000 FT2	Early/Late			
	Daconil Ultrex	5.0 OZ/1000 FT2	Late			
	Chipco 26GT	4.0 FL OZ/1000 FT2	Late			
42	Civitas	8.0 FL OZ/1000 FT2	Early/Late	0.0f	7.8ab	0.648a
	Harmonizer	0.5 FL OZ/1000 FT2	Early/Late			
	Concert II	5.5 FL OZ/1000 FT2	Late			
43	Civitas	8.0 FL OZ/1000 FT2	Early/Late	0.0f	7.8ab	0.631a
	Harmonizer	0.5 FL OZ/1000 FT2	Early/Late			
	Instrata	5.5 FL OZ/1000 FT2	Late			
44	Civitas	8.0 FL OZ/1000 FT2	Early/Late	5.0def	6.3e-h	0.616a
	Harmonizer	0.5 FL OZ/1000 FT2	Early/Late			
	Chipco 26GT	4.0 FL OZ/1000 FT2	Late			
	Daconil Action	5.4 FL OZ/1000 FT2	Late			
45	Civitas	14.5 FL OZ/1000 FT2	Early/Late	16.3bc	5.5hij	0.629a
	Harmonizer	4.0 FL OZ/1000 FT2	Early/Late			
46	QP TM/C	6.0 OZ/1000 FT2	Late	0.0f	7.5abc	0.633a
	QP Iprodione	4.0 FL OZ/1000 FT2	Late			
	QP Propiconazole	2.0 FL OZ/1000 FT2	Late			
	Foursome	0.5 FL OZ/1000 FT2	Late			
47	QP TM/C	6.0 OZ/1000 FT2	Late	0.0f	7.5abc	0.635a
	QP Iprodione	4.0 FL OZ/1000 FT2	Late			
	QP Tebuconazole	0.6 FL OZ/1000 FT2	Late			
	Foursome	0.5 FL OZ/1000 FT2	Late			
48	QP Iprodione	4.0 FL OZ/1000 FT2	Late	0.0f	7.5abc	0.631a
	QP Tebuconazole	1.1 FL OZ/1000 FT2	Late			
	Foursome	0.5 FL OZ/1000 FT2	Late			
49	QP Enclave	8.0 FL OZ/1000 FT2	Late	0.0f	7.5abc	0.636a
	Foursome	0.5 FL OZ/1000 FT2	Late			
50	Turficide 400	10.0 FL OZ/1000 FT2	Late	0.0f	6.8c-f	0.612a

^aEarly fungicide treatments applied on Oct. 16th, 2012 and late treatments applied on Nov. 7th, 2012.

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45	Civitas Harmonizer	14.5 FL OZ/1000 FT2 4.0 FL OZ/1000 FT2	Early/Late Early/Late	16.3bc	5.5hij	0.629a
46	QP TM/C QP Iprodione QP Propiconazole Foursome	6.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2 2.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late Late	0.0f	7.5abc	0.633a
47	QP TM/C QP Iprodione QP Tebuconazole Foursome	6.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2 0.6 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late Late	0.0f	7.5abc	0.635a
48	QP Iprodione QP Tebuconazole Foursome	4.0 FL OZ/1000 FT2 1.1 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late	0.0f	7.5abc	0.631a
49	QP Enclave Foursome	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late	0.0f	7.5abc	0.636a
50	Turfcide 400	10.0 FL OZ/1000 FT2	Late	0.0f	6.8c-f	0.612a

^aEarly fungicide treatments applied on Oct. 16th, 2012 and late treatments applied on Nov. 7th, 2012.

^bMean percent diseased area assessed on May 9th, 2013.

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Table 1 (cont): Mean snow mold severity, turf quality, and turf color assessed on May 8th, 2013 at Wawonowin CC in Champion, MI.

Treatment	Rate	Application Timing ^a	Disease Severity ^b	Turf Quality ^c	Turf Color ^d
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56	Civitas Harmonizer Daconil Ultrex Chipco 26GT	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 5.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2	Early/Late Early/Late Late Late	10.0def	5.8e-h 0.670a
57	Civitas Harmonizer Concert II	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 5.5 FL OZ/1000 FT2	Early/Late Early/Late Late	21.3cde	5.5fgh 0.637a
58	Civitas Harmonizer Instrata	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 5.5 FL OZ/1000 FT2	Early/Late Early/Late Late	8.8ef	6.5b-f 0.649a
59	Civitas Harmonizer Chipco 26GT Daconil Action	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 4.0 FL OZ/1000 FT2 5.4 FL OZ/1000 FT2	Early/Late Early/Late Late Late	7.5f	5.8e-h 0.644a
60	Civitas Harmonizer	14.5 FL OZ/1000 FT2 4.0 FL OZ/1000 FT2	Early/Late Early/Late	27.5c	5.3gh 0.576a
61	QP TM/C QP Iprodione QP Propiconazole Foursome	6.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2 2.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late Late	0.0f	7.5ab 0.659a
62	QP TM/C QP Iprodione QP Tebuconazole Foursome	6.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2 0.6 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late Late	0.0f	7.8a 0.629a
63	QP Iprodione QP Tebuconazole Foursome	4.0 FL OZ/1000 FT2 1.1 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late	0.0f	7.3abc 0.629a
64	QP Enclave Foursome	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late	0.0f	7.5ab 0.670a
65	Turfcide 400	10 FL OZ/1000 FT2	Late	3.8f	6.5b-f 0.649a
66	Chipco 26GT Daconil WeatherStik	4.0 FL OZ/1000 FT2 5.5 FL OZ/1000 FT2	Late Late	6.3f	6.0d-g 0.678a

^aEarly fungicide treatments were applied on Oct. 8th, 2012 and late treatments were applied on Oct. 30th, 2012.

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Treatment	Rate	Application Timing ^a	Disease Severity ^b	Turf Quality ^c	Turf Color ^d	
55	Civitas Harmonizer Trinity Trinity	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 1.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Early/Late Early/Late Early Late	11.3def	5.8e-h	0.607a
56	Civitas Harmonizer Daconil Ultrex Chipco 26GT	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 5.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2	Early/Late Early/Late Late Late	10.0def	5.8e-h	0.670a
57	Civitas Harmonizer Concert II	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 5.5 FL OZ/1000 FT2	Early/Late Early/Late Late	21.3cde	5.5fgh	0.637a
58	Civitas Harmonizer Instrata	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 5.5 FL OZ/1000 FT2	Early/Late Early/Late Late	8.8ef	6.5b-f	0.649a
59	Civitas Harmonizer Chipco 26GT Daconil Action	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2 4.0 FL OZ/1000 FT2 5.4 FL OZ/1000 FT2	Early/Late Early/Late Late Late	7.5f	5.8e-h	0.644a
60	Civitas Harmonizer	14.5 FL OZ/1000 FT2 4.0 FL OZ/1000 FT2	Early/Late Early/Late	27.5c	5.3gh	0.576a
61	QP TM/C QP Iprodione QP Propiconazole Foursome	6.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2 2.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late Late	0.0f	7.5ab	0.659a
62	QP TM/C QP Iprodione QP Tebuconazole Foursome	6.0 OZ/1000 FT2 4.0 FL OZ/1000 FT2 0.6 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late Late	0.0f	7.8a	0.629a
63	QP Iprodione QP Tebuconazole Foursome	4.0 FL OZ/1000 FT2 1.1 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late Late	0.0f	7.3abc	0.629a
64	QP Enclave Foursome	8.0 FL OZ/1000 FT2 0.5 FL OZ/1000 FT2	Late Late	0.0f	7.5ab	0.670a
65	Turfcide 400	10 FL OZ/1000 FT2	Late	3.8f	6.5b-f	0.649a
66	Chipco 26GT Daconil WeatherStik	4.0 FL OZ/1000 FT2 5.5 FL OZ/1000 FT2	Late Late	6.3f	6.0d-g	0.678a

^aEarly fungicide treatments were applied on Oct. 8th, 2012 and late treatments were applied on Oct. 30th, 2012.

^bMean percent diseased area assessed on May 8th, 2013.

^cQuality was visually assessed where 1 = dead, 6 = acceptable, 9 = dark green.

^dColor was assessed using a TCM 500 NDVI Turf Color Meter from Spectrum Technologies®.