

# Fungicide Application for Dollar Spot Control on Creeping Bentgrass and Annual Bluegrass Putting Green June – August 2009

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## Objective

To evaluate fungicides for preventative control of dollar spot (caused by *Sclerotinia homoeocarpa*) on a mixed stand of creeping bentgrass and annual bluegrass golf course putting green.

## Materials and Methods

This evaluation was conducted at the Joseph Troll Turf Research Center in South Deerfield, MA. The plot consists of creeping bentgrass (*Agrostis stolonifera* 'L-93') and annual bluegrass (*Poa annua*) maintained under putting green conditions. Mowing was performed five times per week (0.156-inch cutting height) with a Toro Flex 21 greens mower and clippings collected. 17-0-17 fertilizer was applied at a rate of 0.5 lb nitrogen (N)/1000 ft<sup>2</sup> on 1 May, 0.5 lb N/1000 ft<sup>2</sup> on 23 May, 1.0 lb N/1000 ft<sup>2</sup> on 12 June, and 19-3-19 fertilizer at a rate of 1.0 lb N/1000 ft<sup>2</sup> on 23 July. Core aeration was performed on 17 July utilizing 0.5-inch hollow tines spaced 2" x 2" at a depth of 3 inches. The site was irrigated as needed to prevent drought stress.

Annual grassy weeds were controlled with Barricade 65 WG (0.37 oz/1000 ft<sup>2</sup>) on 29 April. Insect pests were suppressed with Sevin (6 oz/1000 ft<sup>2</sup>) on 25 June and Merit 75WP (0.15 oz/1000 ft<sup>2</sup>) on 20 July. Individual plots measured 3x6 ft (18ft<sup>2</sup>), and were arranged in a randomized complete block design with three replications.

Fungicides (see Table 1) were applied based on label or suggested rates. Individual treatments were applied at a nozzle pressure of 40 psi using a CO<sub>2</sub> pressurized boom sprayer equipped with two XR TeeJet 8004VS nozzles. Treatments were initiated on 11 June 2009 prior to the onset of favorable disease conditions. All fungicides were agitated by hand and applied in the equivalent of 2 gallons of water per 1000 ft<sup>2</sup>. Applications were made on 11 June (all treatments), 25 June (14-d treatments), 3 July (21-d treatments), 10 July (14-d and 28-d treatments), 24 July (14-d and 21-d treatments), 6 August (14-d and 28-d treatments), 12 August (21-d treatments), 20 August (14-d treatments) and 4 September (all treatments). Dollar spot severity was rated by counting disease infection centers each week. Data was subject to an analysis of variance and means were separated with Tukey's Honest Significant Difference test. The mean percent diseased area for each individual treatment is listed in Table 1.

## Results and Discussion

### *Environmental Condition Summary*

Environmental conditions were favorable at the beginning of the trial for dollar spot and most plots showed some infection during the first week of the trial (Table 1). This is likely due to the infection that occurred while fungicide active ingredients were being translocated within turfgrass after application. Dollar spot symptoms persisted for roughly two weeks and then subsided with cooler nighttime temperatures during 5-21 July. Nighttime low temperatures ranged from 46-62°F during that time period with only three nights above 60°F.

Following the unseasonably cool July, dollar spot disease pressure increased (22 July-5 August) and untreated check plots showed an increase of dollar spot infection centers (14 infection center average on 24 July to an average of 83 infection center 6 August). Low nighttime temperatures (47-52°F) on 6-9

August allowed the turfgrass to recover from infection on most plots and the results were reflected in the 12 August rating. Weather conditions remained highly favorable for dollar spot infection from 10-27 August (untreated plots averaged roughly 90 infections centers). From 28 August to 15 September (conclusion of the study) nighttime temperatures routinely dropped below 60°F, despite the cooler temperatures, untreated check plots increased slightly in damage. The 2009 summer was cooler and wetter than usual, however, substantial disease pressure was still observed in the month of August.

### *Dollar Spot Control*

Most fungicides provided excellent control of dollar spot throughout the trial. Trimmit applied alone and in combination with Rhapsody provided excellent control throughout the study. However, Rhapsody alone did not provide adequate control throughout the trial. Honor (boscalid and pyraclostrobin) provided excellent control throughout the study. All DMI class fungicides (Trinity, Banner MAXX, QP Myclobutanil 20 EW) provided excellent control when applied alone or tank-mixed. Emerald applied alone and with Trinity provided excellent control. The experimental product DPX-LEM17-50-76 provided excellent control at both the rates used in the study. All treatments that included the active ingredient chlorothalonil that were not tank-mixed showed an increase in disease 14 days after application. Civitas applied alone and tank-mixed with Banner MAXX and Daconil Ultrex provided acceptable control throughout the study. This suggests that Civitas may be capable of playing a role in resistance management strategies. Disarm C, Disarm M, and the experimental fungicide ARY-473-013 all provided excellent control, whereas Disarm 480 SC showed increased disease 14 days after application. The experimental fungicide CX-15 and CX-08 (tank-mixed with Cleary's 3336) provided excellent control. Both Quali-Pro Ipro 2 SE and TM 4.5 Flowable provided excellent control. QP Chlorothalonil 720 SFT showed excellent control 7 days after application, however, dollar spot was consistently observed 14 days after application.

### *Secondary disease control*

Brown patch (caused by *Rhizoctonia solani*) was observed on 6 August when ratings were made on on select plots with 35% severity on the untreated check. Percent disease data was significantly different ( $P < 0.001$ ) and most treatments preformed well (0% disease). Treatments that included Trimmit averaged 5-15% disease severity. Treatments of Civitas that did not include Banner MAXX or Daconil Ultrex averaged 5-25% disease severity. Treatments of Emerald, CX-08 (tank-mixed with Cleary's 3336), Daconil Ultrex, QP Chlorothalonil 720 SFT and Banner MAXX also revealed brown patch damage (Table 1). Brown patch was again rated on 28 August (25% on untreated check). Percent disease data was significantly different ( $P < 0.001$ ) and most treatments preformed well (0% disease). Treatments containing Trimmit were the most notably damaged. This suggests that application of Trimmit may increase creeping bentgrass susceptibility to brown patch. The following treatments were also damaged: Rhapsody, Emerald, DPX-LEM17-50-76 (0.5 oz/1,000 ft<sup>2</sup> rate only), QP Myclobutanil 20 EW and Banner MAXX.

*Pythium* blight (caused by *Pythium aphanidermatum*) was observed on select plots and rated on 20 August. Percent disease data was significantly different ( $P < 0.016$ ) and most treatments preformed well (0% disease). Treatments that included Trimmit, DPX-LEM17-50-76 (0.3 oz/1,000 ft<sup>2</sup> rate only), Civitas (applied alone), Daconil Ultrex (applied alone), TM 4.5 Flowable and QP Chlorothalonil 720 SFT all showed damage (Table 2). *Pythium* damage was not observed on untreated check plots.

### *Turf Quality*

Phytotoxicity was not observed on any of the treatments applied. The application of Trimmitt did result in a darker green color and reduction in turfgrass growth. Treatments that contained Civitas and the Civitas Harmonizer did also show a temporary green-up increase (7-10 days). All other treatments did not cause any phytotoxicity, nor was any enhanced color observed. All treatments provided acceptable turfgrass quality.



Table 1 (continued).

Treatment and rate per 1,000 sq ft <sup>3</sup>	Dollar spot infection centers <sup>1</sup>						Pythium <sup>2</sup>		Brown Patch <sup>2</sup>	
	12-Aug	20-Aug	28-Aug	6-Sep	15-Sep	AUDPC <sup>4</sup>	20-Aug	6-Aug	28-Aug	25 A
Untreated	32 A	89 A	93 A	97 A	124 A	67.6 A	0 B	35 A	28-Aug	25 A
Rhapsody 10 oz.	29 A	96 A	87 A	45 B	109 A	62.7 A	0 B	8 BC	7 B	7 B
Rhapsody 10 oz. + Trimmitt 0.367 oz.	0 B	1 B	0 B	0 C	0 B	23.0 BCD	3 AB	5 C	12 AB	12 AB
Trimmitt 0.37 oz.	0 B	1 B	0 B	0 C	1 B	23.5 BCD	5 AB	15 BC	8 B	8 B
Honor 0.7 oz.	0 B	0 B	0 B	0 C	0 B	13.9 BCD	0 B	0 C	0 B	0 B
Honor 1.1 oz.	0 B	0 B	0 B	0 C	0 B	15.8 BCD	0 B	0 C	0 B	0 B
Insignia 0.7 oz. + Trinity 1 oz.	0 B	0 B	0 B	0 C	0 B	12.7 BCD	0 B	0 C	0 B	0 B
Emerald 0.13 oz.	0 B	0 B	0 B	0 C	0 B	12.3 BCD	0 B	7 C	2 B	2 B
Trinity 1.0 oz	0 B	0 B	0 B	0 C	0 B	8.6 CD	0 B	0 C	0 B	0 B
DPX-LEM17-50-76 0.3 oz.	0 B	0 B	0 B	0 C	0 B	10.5 BCD	5 AB	0 C	0 B	0 B
DPX-LEM17-50-76 0.5 oz.	0 B	0 B	0 B	0 C	0 B	11.4 BCD	0 B	0 C	8 B	8 B
Civitas 14.5 oz. + Civitas Harmonizer 0.91 oz.	0 B	4 B	0 B	0 C	1 B	17.2 BCD	9 A	5 C	0 B	0 B
Civitas 14.5 oz. + Civitas Harmonizer 0.91 oz. + Banner										
MAXX 14.3 EC 0.5 oz. + Daconil Ultrex 825 WDG 1.5 oz.	0 B	0 B	0 B	0 C	0 B	7.5 CD	0 B	0 C	0 B	0 B
Civitas 7.25 oz. + Civitas Harmonizer 0.45 oz. + Banner										
MAXX 14.3 EC 0.5 oz. + Daconil Ultrex 825 WDG 1.5 oz.	0 B	0 B	0 B	0 C	0 B	9.7 CD	0 B	0 C	0 B	0 B
Civitas 7.25 oz. + Civitas Harmonizer 0.45 oz. + Banner										
MAXX 14.3 EC 0.5 oz. + Daconil Ultrex 825 WDG 1.5 oz.	0 B	0 B	0 B	0 C	0 B	14.6 BCD	0 B	25 AB	0 B	0 B
Banner MAXX 14.3 EC 2 oz. + Daconil Ultrex 825 WDG 3 oz. (28 day)	0 B	0 B	0 B	0 C	0 B	2.4 D	0 B	0 C	0 B	0 B
Disarm 480 SC 0.27 oz.	0 B	8 B	2 B	18 C	6 B	25.4 BC	0 B	0 C	0 B	0 B
Disarm C 4.4 oz.	0 B	0 B	0 B	0 C	2 B	11.6 BCD	0 B	0 C	0 B	0 B
Disarm M 0.75 oz.	0 B	0 B	0 B	0 C	0 B	13.4 BCD	0 B	0 C	0 B	0 B
ARY-473-013 (Granular) 3.5 oz.	0 B	0 B	0 B	0 C	0 B	14.0 BCD	0 B	0 C	0 B	0 B
Daconil Ultrex 825 WDG 3.25 oz.	2 B	3 B	0 B	1 C	0 B	21.7 BCD	0 B	0 C	0 B	0 B
Daconil Ultrex 825 WDG 1.8 oz.	1 B	15 B	0 B	5 C	2 B	24.5 BCD	2 AB	8 BC	0 B	0 B
CLX-15 1 oz. (21 day)	0 B	2 B	0 B	0 C	0 B	5.6 CD	0 B	0 C	0 B	0 B
CLX-08 1 oz. + Cleary's 3336 2 oz. (21 day)	0 B	1 B	0 B	0 C	0 B	6.1 CD	0 B	7 C	0 B	0 B
QP Myclobutanil 20 EW 1.2 oz.	0 B	1 B	0 B	0 C	0 B	12.2 BCD	0 B	0 C	2 B	2 B
Quali-Pro Ipro 2 SE 4 oz.	0 B	0 B	0 B	0 C	0 B	6.6 CD	0 B	0 C	0 B	0 B
TM 4.5 Flowable 2 oz.	0 B	1 B	0 B	0 C	0 B	4.9 CD	2 AB	0 C	0 B	0 B
TM/C WDG 4 oz.	0 B	0 B	0 B	0 C	0 B	3.5 CD	0 B	0 C	0 B	0 B
QP Chlorothalonil 720 SFT 3.5 oz.	0 B	20 B	0 B	12 C	2 B	33.2 B	2 AB	3 C	0 B	0 B
Banner MAXX 14.3 EC 2.0 oz. (21 day)	0 B	0 B	0 B	0 C	0 B	4.5 CD	0 B	8 C	1 B	1 B
ANOVA P	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.016	<0.001	<0.001	<0.001

Table 1 (continued).

- 1 Values are means of three replications. Means followed by the same letter are not significantly different according to Tukey's HSD test.
- 2 Values are percent disease severity
- 3 Fungicides were applied at 14 day intervals unless otherwise noted.
- 4 Area Under Disease Progress Curve (AUDPC).Area under Disease Progress Curve