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Evaluation of Fungicides for Control of Spring Dead Spot Disease in Bermudagrass Turf
2020-21 Report

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The Bottom Line: Seventeen commercial fungicide treatments were tested against an untreated control for their ability to prevent the development of spring dead spot (SDS) disease caused by *Ophiosphaerella narmari* in bermudagrass (*Cynodon* spp.) turf. The study was conducted on the 15th and 16th fairways at Peach Tree Golf and Country Club in Marysville, CA. All treatments were applied preventively on October 13 and November 10, 2020. In addition, one treatment was applied a third time at turf green-up on March 26, 2021. Turf treated with Posterity + Banner Maxx II yielded the overall highest quality ratings during winter dormancy followed closely by several other treatments containing Posterity, and Xzemplar + Maxtima. Considerable SDS disease pressure occurred in the study areas as evidenced by disease severity ratings equating to ca. 40-60% SDS cover in untreated plots. Overall, the best performing treatments in this study included Maxtima, Posterity XT, and Xzemplar + Mirage Stressgard. Based on five consecutive years of SDS research in Northern California, three years in Sacramento and two years in Marysville, our findings suggest that tank-mixtures of a DMI fungicide (especially Maxtima or Mirage Stressgard) with an SDHI fungicide (especially Xzemplar or Posterity) are very effective against SDS disease. More recent evidence has also demonstrated the efficacy of Posterity Forte and XT (containing pydiflumetofen, azoxystrobin, and propiconazole), Navicon Intrinsic (mefentrifluconazole and pyraclostrobin), and Maxtima (mefentrifluconazole) as a standalone active ingredient for control of this disease in Northern California. Research will continue to validate these findings and to examine new chemistries as they become available.

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Introduction

Bermudagrass (*Cynodon* spp.) is considered by many as the "go to" turfgrass species for golf courses, athletic fields, and other turf areas throughout most of California because of its water use efficiency, tolerance to drought, salinity, and traffic, and recovery from wear. Bermudagrass is also tolerant to most pests, especially in California's Mediterranean climate. However, bermudagrass can be susceptible to spring dead spot (SDS), a root disease caused by three primary species of fungi in the genus *Ophiosphaerella* (*O. narmari, O. korrae, O. herpotricha*). Typically, SDS occurs on intensively managed bermudagrass turf that is subject to freezing temperatures and winter dormancy. Although the disease is active during the fall and, in some cases, early spring, symptoms of circular dead patches to not appear until green-up and active growth in spring. Then, turf recovery in affected areas can be very slow and often symptoms reappear in the same vicinity year after year.

Cultural and chemical management of SDS provides no guarantee of complete disease control. However, it is best to avoid late season nitrogen fertilization even though results are mixed. Winter hardy bermudagrass cultivars that are best adapted for the U.S. transition zone tend to be more tolerant to SDS, however, these cultivars are usually not well adapted for use in California because they enter winter dormancy earlier than desired. If there is a history of SDS on bermudagrass in California, usually it is best to apply a fungicide or fungicides beginning in late September or early October followed by a repeat

application 30 days after. Historically, the DMI and QoI fungicides have been most effective on SDS. More recent focus has included SDHI fungicides for SDS control. Results from three consecutive years of SDS fungicide trials at North Ridge CC (Sacramento) on SDS caused by *O. narmari* demonstrated synergistic or additive effects of tank-mixing DMI or QoI with SDHI fungicides for enhanced control of SDS. Xzemplar (fluxapyroxad) appeared to have the greatest activity on SDS at North Ridge CC among the SDHI fungicides followed by Velista (penthiopyrad) when applied at the highest label rate. Posterity (pydiflumetofen), a new sub-class of SDHI, provided good SDS control at higher rates or with three applications. A similar trend was observed for Exteris Stressgard (fluopyram + trifloxystrobin), a combination of SDHI and QoI active ingredients. Among the DMI fungicides, Mirage Stressgard (tebuconazole) provided the most consistent SDS control when applied alone or in combination with SDHI or QoI fungicides. Maxtima (mefentrifluconazole) appeared to provide similar effective control, but it was tested only one season at North Ridge CC. Among treatments containing QoI fungicides, Lexicon (pyraclostrobin + fluxapyroxad) performed well over three years of testing and Navicon (mefentrifluconazole + pyraclostrobin) performed very well in one year of testing.

Objectives

This study was conducted to evaluate efficacy of 18 different fungicide treatments including an untreated control against spring dead spot (*Ophiosphaerella narmari*) disease preventively in bermudagrass (*Cynodon* spp.) turf maintained as a golf course fairway.

Materials and Methods

The study was conducted on the 15th and 16th fairways at Peach Tree GCC in Marysville, CA. Turf was bermudagrass (*Cynodon* spp.) with a history of SDS caused by *Ophiosphaerella narmari*. Fungicide treatments were applied preventively on October 13 and November 10, 2020. In addition, one treatment was applied around the time of turf green-up on March 26, 2021. Treatments were applied using a CO_2-powered backpack sprayer equipped with TeeJet 8003VS nozzles calibrated to deliver 2 gallons/1000 ft^2 of carrier. In addition, all treatment applications were followed by ca. 0.15 inches of irrigation water after application. Experimental design was a complete randomized block with 5 replications. Plot size was 6 ft × 10 ft. Plots were established in spring 2020 when SDS disease pressure was evident and treatments were assigned randomly and equally based on level of disease severity on plots in both fairways.

Plots were evaluated for fungicide effects on turf quality (1-9; 9=best) during winter dormancy and from the time of spring green-up based primarily on color, density, and disease pressure. Spring dead spot disease severity was rated on a scale from 0-5, with 5 representing 100% disease cover.

Data collected throughout the study were analyzed using analysis of variance for each evaluated trait and rating event separately and the means were compared using the Fisher's protected least significant difference (LSD) test at the 0.05 probability level ($P \leq 0.05$).

Results

None of the treatments caused turf phytotoxicity throughout the study (data not shown). Differences in turf quality during dormancy were found in January 2021 (Table 2). Turf treated with Posterity + Banner Maxx II yielded the overall highest quality ratings followed closely by several other Posterity treatments and Xzemplar + Maxtima. Although still dormant at this time, turf subjected to these treatments was

significantly more appealing in terms of color, density, and uniformity compared to other treatments, especially the untreated control (Fig. 1). Following green up, significant differences among treatments for turf quality were observed on April 28, 2021, which was mostly consistent with SDS disease severity (Table 2).

Considerable SDS disease pressure occurred in the study areas as evidenced by disease severity ratings equating to ca. 40-60% SDS cover in control plots (Table 2). For the purposes of this study, treatments yielding disease severity ratings below 1 were considered very effective against SDS disease; treatments with disease severity ratings between 1-2 were considered marginally effective; and treatments with disease severity ratings above 2 were not effective against this pathogen. Overall, the best performing treatments in this study included Maxtima, Posterity XT, and Xzemplar + Mirage Stressgard.

Based on five consecutive years of SDS research in Northern California, three years in Sacramento and two years in Marysville, our findings suggest that tank-mixtures of a DMI fungicide (especially Maxtima and Mirage Stressgard) with an SDHI fungicide (especially Xzemplar and Posterity) are very effective against SDS disease. More recent evidence has also demonstrated the efficacy of Posterity Forte and XT (containing pydiflumetofen, azoxystrobin, and propiconazole), Navicon Intrinsic (mefentrifluconazole and pyraclostrobin), and Maxtima (mefentrifluconazole) as a standalone active ingredient of this disease in Northern California. Research will continue to validate these results and to examine new chemistries as they become available.

Tables and Figures

Table 1. Fungicide treatments tested in the spring dead spot disease control study in Marysville, CA. 2020-21.

No.	Treatment	Active ingredient	Company	Rate (oz/1000 ft^2)	Timing
1	Untreated Control	-	-	-	-
2	Briskway	azoxystrobin, difenoconazole	Syngenta	0.725	AB
3	Briskway	azoxystrobin, difenoconazole	Syngenta	1.2	AB
4	Maxtima	mefentrifluconazole	BASF	0.80	ABC
5	Mirage Stressgard	tebuconazole	Bayer	2.00	AB
6	Mirage Stressgard	tebuconazole	Bayer	2.00	ABC
7	Navicon Intrinsic	mefentrifluconazole, pyraclostrobin	BASF	0.85	AB
8	Posterity	pydiflumetofen	Syngenta	0.16	AB
9	Posterity	pydiflumetofen	Syngenta	0.32	AB
10	Posterity Forte	pydiflumetofen, azoxystrobin, propiconazole	Syngenta	0.63	AB
11	Posterity Forte	pydiflumetofen, azoxystrobin, propiconazole	Syngenta	0.84	AB
12	Posterity XT	pydiflumetofen, azoxystrobin, propiconazole	Syngenta	3.00	AB
13	Xzemplar	fluxapyroxad	BASF	0.26	AB
14	Posterity	pydiflumetofen	Syngenta	0.16	AB
	Banner Maxx II	propiconazole	Syngenta	2.00	
15	Posterity	pydiflumetofen	Syngenta	0.16	AB
	Maxtima	mefentrifluconazole	BASF	0.80	
16	Posterity	pydiflumetofen	Syngenta	0.16	AB
	Mirage Stressgard	tebuconazole	Bayer	2.00	AB
17	Xzemplar	fluxapyroxad	BASF	0.26	AB
	Maxtima	mefentrifluconazole	BASF	0.80	
18	Xzemplar	fluxapyroxad	BASF	0.26	AB
	Mirage Stressgard	tebuconazole	Bayer	2.00	

Application codes (timing):
A – 10/13/2020
B – 11/10/2020
C – 03/26/2021

Table 2. Effects of fungicide treatments on bermudagrass quality (1-9; 9 = best) during dormancy on January 6 and following spring green-up on April 28; and on spring dead spot disease severity (0-5; 5 = 100% cover). Marysville, CA, 2021.

		Dormant Quality	Spring Quality	Disease Severity	Disease Severity
		1/6	4/28	4/23	5/17
1	Untreated Control	5.9 I	4.8 F	2.7 A	2.2 AB
2	Briskway (0.725 oz/M) - 2 fall apps	7.0 E-H	5.4 C-F	2.2 A-C	2.0 A-C
3	Briskway (1.2 oz/M) - 2 fall apps	7.4 C-F	5.4 C-F	1.8 A-D	1.2 A-E
4	Maxtima (0.8 oz/M) - 2 fall apps	7.2 D-G	6.4 AB	0.2 F	0.2 E
5	Mirage Stressgard (2.0 oz/M) - 2 fall apps	7.2 D-G	5.4 C-F	1.4 B-F	1.2 A-E
6	Mirage Stressgard (2.0 oz/M) - 2 fall apps + 1 app at green-up	6.2 G-I	5.4 C-F	1.2 B-F	1.0 B-E
7	Navicon Intrinsic (0.85 oz/M) - 2 fall apps	6.8 F-I	5.6 B-E	1.0 C-F	0.6 DE
8	Posterity (0.16 oz/M) - 2 fall apps	8.0 A-E	5.4 C-F	0.8 D-F	0.6 DE
9	Posterity (0.32 oz/M) - 2 fall apps	7.7 B-F	5.2 D-F	1.2 B-F	0.8 C-E
10	Posterity Forte (0.63 oz/M) - 2 fall apps	7.8 A-F	5.8 A-E	0.8 D-F	0.4 DE
11	Posterity Forte (0.84 oz/M) - 2 fall apps	8.8 A-B	6.0 A-D	1.6 A-E	1.2 A-E
12	Posterity XT (3.0 oz/M) - 2 fall apps	8.4 A-C	6.6 A	0.2 F	0.2 E
13	Xzemplar (0.26 oz/M) - 2 fall apps	7.2 D-G	5.8 A-E	1.0 C-F	0.8 C-E
14	Posterity (0.16 oz/M) + Banner Maxx II (2.0 oz/M) - 2 fall apps	9.0 A	6.0 A-E	1.0 C-F	0.5 DE
15	Posterity (0.16 oz/M) + Maxtima (0.8 oz/M) - 2 fall apps	7.8 A-F	6.2 A-C	0.8 D-F	0.4 DE
16	Posterity (0.16 oz/M) + Mirage Stressgard (2.0 oz/M) - 2 fall apps	7.1 D-H	6.2 A-C	0.4 EF	0.4 DE
17	Xzemplar (0.26 oz/M) + Maxtima (0.8 oz/M) - 2 fall apps	8.2 A-D	5.8 A-E	0.6 D-F	1.0 B-E
18	Xzemplar (0.26 oz/M) + Mirage Stressgard (2.0 oz/M) - 2 fall apps	7.0 E-H	6.0 A-E	0.4 EF	0.2 E

* Means followed by the same letter in a column are not significantly different (P=0.05).
** Applications: A – 10/13/2020; B – 11/10/2020; C – 03/26/2021.

Figure 1. Turf quality of untreated control plot (left) vs. Treatment 14 [Posterity (0.16 oz/M) + Banner Maxx II (2.0 oz/M)] plot (right) on January 6, 2021. Marysville, CA.