

Evaluation of Fungicides on Creeping Bentgrass Under Drought Stress

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Certain fungicides are known to improve plant health and abiotic stress tolerance in addition to providing protection against pathogens. This was a follow-up to a study conducted last year where we evaluated several fungicides, plant growth regulators (PGRs) and nitrogen on bermudagrass under deficit irrigation. Results pointed toward increased turf quality and greater rooting characteristics among the treatments under severe drought stress, most notably the Intrinsic brand of fungicides from BASF that contain pyraclostrobin. These results are supported by other research that has demonstrated enhanced rooting and plant health following application of this active ingredient.

The objectives of this study were to explore the fungicide plant health and rooting phenomena further by predisposing creeping bentgrass turf to fungicide applications followed by a gradual and then severe reduction in water. We also wanted to determine if the treatments play a role in turf recovery following core aeration.

Location:	UCR Turf Facility
Soil:	Loamy sand amended with sand topdressing
Experimental Design:	Randomized complete block; four replications
Plot Size:	4 ft x 10 ft
Species/Cultivars:	Creeping bentgrass (<i>Agrostis stolonifera</i> L.) 'Cobra'
Mowing Height:	0.180 inches; 3 days/wk
Irrigation:	80% ETo/DU; following initial application of fungicides on 4 August 2011, irrigation was reduced incrementally by lowering run time approximately 8% every week until the final fungicide applications were made 4 weeks later; plot area was then irrigated by hand deeply and uniformly followed by no irrigation for 5 days leading up to core aeration; minimal water was applied thereafter to prevent desiccation following cultivation and to evaluate drought stress tolerance among treatments leading up to Field Day.
Cultivation:	standard practices include verticutting and solid-tine aeration alternated monthly with sand topdressing; on 9 Sep 2011, half of each plot was core aerated using ½-inch tines, cores removed, and entire plot area was topdressed with sand.
Fertility:	0.5 lbs N/1000 ft ² /month until July 2011 0.2 lbs N/1000 ft ² on 26 August 2011 0.25 lbs N/1000 ft ² on 10 September 2011

Sprayer: CO₂-powered hand boom
TeeJet 8004VS nozzles
9-inch spacing
12-inch boom height
Speed: 2 mph
Output: 87 GPA
Pressure: 32 psi @ tank

Data Collected: Bentgrass quality (1-9, 9 = best); NDVI (plant health); dollar spot severity (0-100%); bentgrass recovery from cultivation (1-9, 9 = best); drought severity (1-9, 9 = best); rooting characteristics

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Preliminary Results:

- ✓ Turf stress resulting from five consecutive days without irrigation was minimal despite daytime high temperatures near or above 100F. This was partially due to the amount of irrigation applied beforehand to help ensure uniform moisture and drying in the root zone profile.
- ✓ Although this study was not intended to evaluate disease control, an outbreak of dollar spot disease occurred on the area, most likely due to leaner nitrogen fertility employed since the start of the study.
- ✓ The Intrinsic brand fungicides (Pillar, Honor, and Insignia), Daconil ACTion, and Interface effectively controlled the disease and thus also demonstrated the highest turf quality and numerically highest NDVI values after the five-day dry-down.
- ✓ Last year, a single treatment of 4 lbs N/1000 ft² applied as a granular helped improve, or at least did not worsen, bermudagrass health and rooting in response to drought stress. In case you have ever thought about it, never spray 4 lbs N/1000 ft² of ammonium sulfate on bentgrass turf at one time during the summer. Even irrigation shortly thereafter could not save the turf.

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 UCR Turf Facility; Plot 12E-22; Plot size: 4 ft x 10 ft

North

10	4	10	7
9	1	3	6
8	3	6	4
7	7	8	8
6	2	1	5
5	6	4	10
4	8	9	9
3	10	2	3
2	5	7	1
1	9	5	2

Table 1. Bentgrass quality (1-9, 9 = best), NDVI, and dollar spot severity (0-100%) on 9 Sep 2011 following five days of no irrigation. Riverside, CA.

Trt	Product	Rate/M	Timing	Bentgrass Quality	NDVI	Dollar Spot
1	Untreated	--	--	7.3 bc	0.840 ab	7.5 bc
2	Pillar G	3 lb	AD	8.0 a	0.853 ab	0.0 c
3	Honor	1.1 oz	AD	8.0 a	0.860 a	0.0 c
4	Insignia SC	0.7 oz	AC	8.0 a	0.850 ab	0.0 c
5	Heritage WG	0.4 oz	AD	7.3 bc	0.843 ab	11.8 ab
6			AD	7.3 bc	0.830 b	21.3 a
7	Daconil ACTION	3.6 oz	ABD	8.0 a	0.855 ab	0.0 c
8	Signature	4 oz	ABD	7.0 c	0.838 ab	22.5 a
9	Interface	5 oz	ABD	7.8 ab	0.855 ab	0.0 c
10	40-0-0	2 lbs N	A			
10	21-0-0	4 lbs N	D	2.5 d	0.543 c	0.0 c
	LSD ($\alpha = 0.05$)	--	--	0.6	0.029	11.7

Treatment means followed by the same letter are not significantly different ($\alpha = 0.05$).

Application Dates: A = 4 August 2011
 B = 18 August 2011
 C = 26 August 2011
 D = 2 September 2011

Table 2. Products tested in the bentgrass stress study.

Product	Manufacturer	Common Name(s)	Notes
Pillar G	BASF	Pyraclostrobin + Triticonazole	
Honor	BASF	Pyraclostrobin + Boscalid	Boscalid for dollar spot control
Insignia SC	BASF	Pyraclostrobin	
Heritage WG	Syngenta	Azoxystrobin	
Daconil ACTION	Syngenta	Chlorothalonil + Acibenzolar-S-methyl	
Signature	Bayer	Fosetyl-Al	Phosphonate fungicide with StressGuard pigment
Interface	Bayer	Iprodione + Trifloxystrobin	Premix of active ingredients 26GT and Compass with StressGuard pigments
40-0-0		Methylene urea	
21-0-0		Ammonium sulfate	