

Evaluation of Fungicide Programs for Disease Control on Creeping Bentgrass Greens.

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Objective

The objective of this experiment was to evaluate the effectiveness of pre-defined fungicide application programs for summer disease control on creeping bentgrass greens.

Rationale

Dollar spot and brown patch are diseases of creeping bentgrass that require regular attention by golf course superintendents. They are controlled with periodic applications of penetrant and contact fungicides during spring and summer months. Selection of fungicides for any given application must be made with consideration of other diseases that may threaten golf greens, and stressful conditions that prevail as temperatures rise during June, July and August. Fungicide programs pre-define selections, and may benefit superintendents in budgeting for summer disease management expenses. Fungicide manufacturers develop programs around their flagship products, but may include products manufactured by competitors where appropriate. Objective evaluation of various programs will yield important information for superintendents considering the program approach.

How it was done

The research was conducted at the Purdue University Daniel Turfgrass Research and Diagnostic Center in West Lafayette, IN. The experimental site was a stand of Penn A4 creeping bentgrass maintained at a height of 0.135 in. Fertilization, irrigation and aerification operations were done according to standard practices for creeping bentgrass greens. During spring and summer 2003, fertilizer (18-4-10) was applied at a rate of approximately 0.75 lb N per 1000 sq ft on 14 April and 20 August.

Individual treatment plots measured 3.3 ft by 6.6 ft (1m x 2m) and were randomized within each of the 4 replications. Plots were inoculated with a sorghum seed culture of *Rhizoctonia solani* on 20 June. Fungicide applications were made using a custom-built bicycle wheel boom sprayer. Three nozzles (Tee-Jet 8004 EVS, flat fan) were mounted approximately 12 in. apart on a boom located 12 in. from the ground. The sprayer was calibrated to deliver 2 gal per 1000 sq ft at 40 psi. All treatments were initiated on 28 May. The date of the final application was 20 August. All treatments were applied at 14 day intervals; they are described in the description of fungicide programs (Table 1).

Fungicide performance was evaluated at approximately 7-day intervals using the Horsfall-Barratt system for visual assessment of disease severity. Both dollar spot and brown patch were assessed. Data were subjected to analysis of variance and mean separation procedures. Results are presented in Tables 2 and 3. Turf quality was also assessed on a regular basis using a 0-9 scale where a score of 9 represented excellent turf quality. Any score below 6.0 indicated unacceptable levels of turf quality. Turf quality evaluations are presented in Table 4.

Results

Dollar spot pressure was rather mild during the 2003 season. From my perspective, environmental conditions favored limited outbreaks of dollar spot in mid-May, and early July. The prevailing weather during July and August of 2003 was generally favorable for brown patch development. Two periods were markedly favorable. Heavy rains during the first 2 weeks of July, accompanied by high evening temperatures, resulted in extensive brown patch development. Another period of hot, humid weather prevailed in early August and resulted in another bloom of brown patch activity.

The data in the tables are self-explanatory. In general, the Dow and Bayer programs resulted in excellent disease control and turf quality. There was no phytotoxicity observed in any of the plots.

Table 1. Fungicide Program Descriptions. 2003

Dow Program A Fungicides	Application rate /1000 ft²	Spray date
Eagle 40 WSP + Fore WSP 80WP	0.6 oz + 6.0 oz	May 28
Fore WSP 80WP	6.0 oz	Jun 11
Eagle 40 WSP + Prostar 70W	0.6 oz + 1.5 oz	Jun 25
Fore WSP 80WP + Chipco 26GT	6.0 oz + 4.0 fl oz	Jul 9
Heritage 50 WDG + Curalan 50 DF	0.2 oz + 1.0 oz	Jul 23
Eagle 40 WSP + Fore WSP 80WP	0.6 oz + 6.0 oz	Aug 6
Fore WSP 80WP + Chipco 26GT	6.0 oz + 4.0 oz	Aug 20

Dow Program B Fungicides	Application rate /1000 ft²	Spray date
Eagle 40 WSP + Fore WSP 80WP	0.6 oz + 6.0 oz	May 28
Daconil Ultrex 82.5 WDG	3.2 oz	Jun 11
Eagle 40 WSP + Prostar 70W	0.6 oz + 1.5 oz	Jun 25
Daconil Ultrex 82.5 WDG + Chipco26GT	3.2 oz + 4.0 fl oz	Jul 9
Heritage 50 WDG + Curalan 50 DF	0.2 oz + 1.0 oz	Jul 23
Eagle 40 WSP + Fore WSP 80WP	0.6 oz + 6.0 oz	Aug 6
Daconil Ultrex 82.5 WDG	3.2 oz	Aug 20

Bayer Program C Fungicides	Application rate /1000 ft²	Spray date
Chipco Signature 80WDG + Bayleton 50W	4.0 oz + 1.0 fl oz	May 28
Chipco Signature 80WDG + Chipco 26GT	4.0 oz + 4.0 fl oz	Jun 11
Compass 50 WDG + Daconil 82.5 WDG + Chipco Signature 80WDG	0.15 oz + 3.2 oz + 4.0 oz	Jun 25
Chipco26GT + Chipco Signature 80WDG	4 fl oz + 4 oz	Jul 9
Chipco Signature 80WDG + Daconil Ultrex 82.5 WG + Bayleton 50 W	4.0 oz + 1.8 oz + 0.25 oz	Jul 23
Chipco Signature 80WDG + Compass 50WG + Chipco 26GT	4.0 oz + 0.15 oz + 2.0 fl oz	Aug 6
Chipco Signature 80WDG + Bayleton 50W	4.0 oz + 0.5 oz	Aug 20

Bayer Program D Fungicides	Application rate /1000 ft²	Spray date
Chipco Signature 80WDG + Bayleton 50W	4.0 oz + 0.5 oz	May 28
Chipco Signature 80WDG + Daconil Ultrex 82.5 WG	4.0 oz + 3.2 oz	Jun 11
Chipco Signature 80WDG + Chipco 26GT	4.0 oz + 4.0 fl oz	Jun 25
Chipco Signature 80WDG + Daconil Ultrex 82.5 WG + Bayleton 50 W	4.0 oz + 1.8 oz + 0.25 oz	Jul 9
Chipco Signature 80WDG + Compass 50WG + Chipco 26GT	4.0 oz + 0.15 oz + 2.0 fl oz	Jul 23
Chipco Signature 80WDG + Daconil Ultrex 82.5 WG + Bayleton 50 W	4.0 oz + 1.8 oz + 0.25 oz	Aug 6
Chipco Signature 80WDG + Compass 50WG + Chipco 26GT	4.0 oz + 0.15 oz + 2.0 fl oz	Aug 20

Griffin Program E Fungicides	Application rate /1000 ft²	Spray date
Vital 4L + Junction	6.0 fl oz + 2.0 oz	May 28
Vital 4L + Concorde DF	6.0 fl oz + 3.2 oz	Jun 11
Vital 4L + Junction	6.0 fl oz + 2.0 oz	Jun 25
Vital 4L + Concorde DF	6.0 fl oz + 3.2 oz	Jul 9
Vital 4L + Junction	6.0 fl oz + 2.0 oz	Jul 23
Vital 4L + Concorde DF	6.0 fl oz + 3.2 oz	Aug 6
Vital 4L + Junction	6.0 fl oz + 2.0 oz	Aug 20

Griffin Program F Fungicides	Application rate /1000 ft²	Spray date
LBG-31FCL + Junction	6.0 fl oz + 1.0 oz	May 28
Vital 4L + Concorde DF	6.0 fl oz + 3.2 oz	Jun 11
LBG-31FCL + Junction	6.0 fl oz + 1.0 oz	Jun 25
Vital 4L + Concorde DF	6.0 fl oz + 3.2 oz	Jul 9
LBG-31FCL + Junction	6.0 fl oz + 1.0 oz	Jul 23
Vital 4L + Concorde DF	6.0 fl oz + 3.2 oz	Aug 6
LBG-31FCL + Junction	6.0 fl oz + 1.0 oz	Aug 20

Table 2. Efficacy of fungicide programs for control of dollar spot on creeping bentgrass. The top part of the table contains results from June 9 through July 21. The bottom part contains results from July 28 through September 8, 2003.

		Dollar spot severity (%)							
		Evaluation date							
TRT	Fungicide Program	6/09	6/16	6/23	6/30	7/02	7/08	7/14	7/21
1	no fungicide	1.3	1.6	1.6	1.6	3.9	1.6	1.6	2.7
2	Dow Program A	0.0	1.6	1.6	0.0	0.8	1.1	1.3	1.6
3	Dow Program B	0.8	1.1	0.8	0.8	0.0	0.8	0.0	0.0
4	Bayer Program C	0.0	1.6	1.1	0.0	0.0	0.0	0.0	0.0
5	Bayer Program D	0.0	1.1	1.1	0.0	0.0	0.8	0.0	0.0
6	Griffin Program E	1.1	1.3	1.3	1.6	1.6	1.6	1.6	1.6
7	Griffin Program F	1.3	1.6	1.6	0.8	0.8	1.3	1.6	1.6
Fisher's unprotected LSD P=0.05		0.56	0.53	0.47	0.38	0.38	0.58	0.26	0.75

		Dollar spot severity (%)						
		Evaluation date						
TRT	Fungicide Program	7/28	8/04	8/11	8/18	8/25	9/02	9/08
1	No fungicide	5.2	4.6	4.6	7.9	5.2	6.5	6.5
2	Dow Program A	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Dow Program B	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Bayer Program C	0.8	0.0	0.0	0.0	0.0	0.0	0.0
5	Bayer Program D	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Griffin Program E	3.3	3.3	1.3	4.0	4.6	13.4	10.6
7	Griffin Program F	2.7	2.7	1.3	2.1	1.1	6.5	6.5
Fisher's unprotected LSD P=0.05		1.88	2.15	1.85	4.85	2.16	5.26	4.71

Table 3. Efficacy of fungicide programs for control of brown patch on creeping bentgrass greens.

TRT	Fungicide Program	Brown patch severity (%)						
		Evaluation date						
		7/28	8/04	8/11	8/18	8/25	9/02	9/08
1	no fungicide	6.5	3.3	11.9	50.7	50.7	62.1	56.3
2	DOW Program A	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	DOW Program B	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Bayer Program C	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Bayer Program D	1.1	0.0	0.0	0.0	0.0	0.0	0.0
6	Griffin Program E	1.6	1.6	3.2	1.9	28.0	32.7	45.9
7	Griffin Program F	1.3	1.1	2.7	1.1	5.6	6.5	35.3
Fisher's unprotected LSD P=0.05		1.70	0.74	3.17	7.51	18.75	13.37	17.88

Table 4. Turf quality evaluations for fungicide programs targeted towards brown patch and dollar spot on creeping bentgrass greens.

TRT	Fungicide Program	Date of turf quality evaluations										
		7/02	7/08	7/16	7/21	7/28	8/04	8/11	8/18	8/25	9/02	9/08
1	no fungicide	5.8	5.8	5.5	5.3	4.3	4.5	4.8	2.8	3.3	2.5	3.0
2	DOW Program A	7.3	7.5	7.3	7.3	7.5	8.0	8.5	8.8	8.0	9.0	8.8
3	DOW Program B	7.3	7.5	7.5	8.0	7.5	8.3	8.3	8.3	8.3	8.5	8.8
4	Bayer Program C	7.8	7.8	8.0	8.0	7.3	8.0	8.0	8.0	8.0	8.3	8.3
5	Bayer Program D	7.3	7.8	8.0	7.8	7.5	8.0	8.0	8.0	8.5	8.3	8.3
6	Griffin Program E	6.8	6.0	7.3	7.0	5.0	5.0	6.5	5.5	5.0	3.0	3.0
7	Griffin Program F	7.5	7.3	7.5	6.8	5.3	5.0	6.0	6.3	7.0	4.3	3.5
Fisher's unprotected LSD P=0.05		0.71	0.88	0.74	0.58	0.70	0.21	0.87	0.78	0.64	0.64	0.81