

## PHOSPHOROUS ACID MANAGEMENT PROGRAMS

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### Summer Stress Syndrome in Bentgrass

This trial was conducted on a Penncross creeping bentgrass green at the Hancock Turfgrass Research Center, E. Lansing, MI. The plot area was mowed at 0.125" and fertility was as listed below. The study was set up in a randomized complete block design with four replications of each treatment. Plots measured 2' x 4.5' with 1' alleys. Treatments were applied at 34 PSI in a 48 GPA spray volume using a CO<sub>2</sub> backpack sprayer and a single 8002E tee-jet flat fan nozzle. Initial application of treatments 1-13 and 15-25 was on 26 May, treatment 14 on 9 June, treatment 27 on 21 July, and treatment 26 on 27 July. Re-applications were made on intervals as indicated in the tables below. Treatments on a 7-day interval were applied 13 times, 14-day interval 7 times, 21-day interval twice, and 28-day interval 4 times. For specific application dates, see Table 1. A ½ # nitrogen 1000 ft<sup>2</sup> application was made on 30 May with subsequent fertilizer applications of ¼ # nitrogen ft<sup>2</sup> on 13 June, 27 June, 11 July, 24 July, and 9 August. Due to the varied fungicide combinations tested in this study, no additional chemical applications were made to control dollar spot but instead, a 2 oz Chipco 26GT treatment #26 was added on 26 July to serve as a control without turf loss from dollar spot. Quality ratings were visually estimated using a 1 to 10 scale, where 1 = poor, 10 = excellent, and 7 = acceptable. Data were analyzed using ANOVA and means separated by LSD (p = 0.05).

The weather we experienced this summer was not typical with regard to stress for growing grass as we had plenty of rain and cool temperatures that did not reach 90°F. Many treatments provided turf quality that was superior to our untreated control and the control with Chipco 26GT to manage dollar spot later in the season. Several treatments provided good season-long turf quality. Three 14-day treatments, including Signature at the 4 oz rate in combination with Chipco 26GT (4 oz) and Daconil Ultrex (3.8 and 3.5 oz) and another combination treatment with Heritage (0.4 oz) at 28 days + Daconil Ultrex (3.2 oz) + Aliette (4 oz) on a 14-day schedule, were among those with the best overall quality for the duration of the study. Overall turf quality was affected by a dollar spot outbreak later in the season since it resulted in lower density and overall quality. Fore Rainshield + Signature provided excellent quality throughout most of the study and then received lower ratings in August due to thinning from dollar spot infestation. By the last rating date, the WAC 3 and 4 fl oz combinations with Daconil Ultrex provided significantly better quality than the Daconil Ultrex alone at the same rate. Similarly, the 1.5 oz rate of Daconil on a 7-day interval, in combination with MKP, provided similar quality as Daconil Ultrex (3.8 oz) + Signature (4 oz) at 14 days by the end of August, as did MacroSorb + Daconil Ultrex (3.8 oz), which was initiated later in the season than most treatments.

Table 1. Mean quality ratings (LSD,  $p = 0.5\%$ ) for summer bentgrass decline.

	Treatment Rate/1000ft <sup>2</sup>	Interval (Days)	27-Jun	12-Jul	25-Jul	8-Aug	25-Aug
1	Daconil Ultrex 3.8 oz	14	7.8 <sup>a</sup> b-d	7.8 c-f	7.3 cd	7.3 d-f	7.3 b-e
2	Aliette Signature 4 oz	14	8.3 ab	8.3 a-d	6.8 d-f	6.8 f-h	6.3 f-h
3	Daconil Ultrex 3.8 oz + Aliette Signature 4 oz	14	8.3 ab	8.8 ab	8.0 ab	8.3 ab	8.0 ab
4	Daconil Ultrex 1.9 oz	14	7.5 b-e	7.3 e-g	7.0 de	7.0 e-g	7.0 c-f
5	Aliette Signature 2 oz	14	7.0 c-f	7.5 d-g	7.0 de	6.8 f-h	6.5 e-h
6	Daconil Ultrex 1.9 oz + Aliette Signature 2 oz	14	8.3 ab	8.5 a-c	7.8 bc	7.5 c-e	7.3 b-e
7	Aliette Signature 4 oz + Chipco 26GT 4 fl oz	14	8.5 ab	8.3 a-d	7.8 bc	8.0 bc	8.0 ab
8	Fore Rainshield 8 oz + Fosphite 8 fl oz	14	7.5 b-e	7.3 e-g	6.3 fg	7.0 e-g	6.8 d-g
9	Fore Rainshield WSP 8 oz + Aliette Sig. 4 oz	14	9.0 a	9.0 a	8.5 a	7.0 e-g	7.0 c-f
10	Daconil Ultrex 3.5 oz + Aliette Signature 4 oz	14	8.5 ab	9.0 a	8.3 ab	8.0 bc	8.3 a
11	Fosphite 8 fl oz	14	6.8 d-f	6.8 g-i	6.5 e-g	6.3 hi	6.0 gh
12	Heritage 0.4 oz + Daconil Ultrex 3.2 oz + Aliette Signature 4 oz	28 14	9.0 a 	9.0 a 	8.3 ab 	8.8 a 	8.3 a 
13	Heritage 0.4 oz + Daconil Ultrex 3.2 oz	28 14	8.0 a-c 	8.0 b-e 	7.3 cd 	7.3 d-f 	7.5 a-d 
14	Macro Sorb 2 oz	14	6.8 d-f	7.0 f-h	6.3 fg	6.0 i	6.0 gh
15	WAC79 2 fl oz + Dac Ultrex 3.8 oz	14	7.8 b-d	8.0 b-e	6.8 d-f	7.8 b-d	7.0 c-f
16	WAC79 3 fl oz + Dac Ultrex 3.8 oz	14	8.0 a-c	7.8 c-f	6.8 d-f	7.0 e-g	7.3 b-e
17	WAC79 4 fl oz + Dac Ultrex 3.8 oz	14	7.8 b-d	8.3 a-d	7.0 de	6.8 f-h	7.8 a-c
18	WAC79 2 fl oz + Protect T/O 5 oz	14	6.8 d-f	7.0 f-h	6.5 e-g	6.5 g-i	6.3 f-h
19	WAC79 3 fl oz + Protect T/O 5 oz	14	6.8 d-f	7.0 f-h	6.5 e-g	6.8 f-h	6.3 f-h
20	WAC79 4 fl oz + Protect T/O 5 oz	14	6.5 ef	6.8 g-i	6.5 e-g	6.8 f-h	6.3 f-h
21	WAC79 2 fl oz + 3336 WP 4 oz	14	6.8 d-f	7.3 e-g	7.0 de	7.0 e-g	6.5 e-h
22	WAC79 3 fl oz + 3336 WP 4 oz	14	6.8 d-f	7.0 f-h	6.8 d-f	7.0 e-g	6.3 f-h
23	WAC79 4 fl oz + 3336 WP 4 oz	14	6.3 f	6.8 g-i	6.5 e-g	7.0 e-g	6.8 d-g
24	MKP 5# / acre	7	6.0 f	5.8 j	6.3 fg	6.0 i	5.8 h
25	Daconil Ultrex 1.5 oz + MKP 5# / acre	7	7.0 c-f	6.3 h-j	6.3 fg	6.5 g-i	7.8 a-c
26	Chipco 26GT 2 oz (Control)	21	NA	6.8 g-i	6.0 g	6.0 i	6.3 f-h
27	Macro Sorb 2 oz + Daconil Ultrex 3.8 oz	14	NA	7.0 f-h	6.3 fg	6.8 f-h	7.5 a-d
28	Untreated Control	--	6.8 d-f	6.0 ij	6.0 g	6.3 hi	5.8 h

<sup>a</sup>Treatments means followed by the same letter do not significantly differ (LSD,  $p = 0.05$ ).

### Summer Stress Syndrome in Annual Bluegrass

This trial was conducted on a *Poa annua* fairway at the Hancock Turfgrass Research Center, E. Lansing, MI. The plot area was mowed at 0.5" and fertility was as listed below with fertilizer applications being made on a 14-day schedule. The study was set up in a randomized complete block design with four replications of each treatment. Plots measured 2' x 4.5' with 1' alleys. Treatments were applied at 34 PSI in a 48 GPA spray volume using a CO<sub>2</sub> backpack sprayer and a single 8002E tee-jet flat fan nozzle. Initial application of treatments 1-13 and 15-25 was on 26 May, treatment 14 on 9 June, treatment 27 on 21 July, and treatment 26 on 27 July. Re-applications were made on intervals as indicated in the table below. Treatments on a 7-day interval were applied 13 times, 14-day interval 7 times, 21-day interval twice, and 28-day interval 4 times. For specific application dates, see Table 2. A ½ # nitrogen 1000 ft<sup>-2</sup> application was made on 30 May with subsequent fertilizer applications of ¼ # nitrogen 1000 ft<sup>-2</sup> on 13 June, 27 June, 11 July, 24 July, and 9 August. Due to the varied fungicide combinations tested in this study, no additional chemical applications were made to control dollar spot but instead, a 2 oz Chipco 26GT treatment was added on 26 July to serve as a control without turf loss from dollar spot. Quality ratings were visually estimated using a 1 to 10 scale, where 1 = poor, 10 = excellent, and 7 = acceptable. Data were analyzed using ANOVA and means separated by LSD (p = 0.05).

Table 2. Mean quality ratings for summer decline in annual bluegrass.

	Treatment Rate/1000ft <sup>2</sup>	Interval (Days)	27-Jun	12-Jul	25-Jul	8-Aug	25-Aug
1	Daconil Ultrex 3.8 oz	14	8.0 <sup>a</sup> b-e	8.0 b-e	8.0 bc	7.5 c-e	6.8 de
2	Aliette Signature 4 oz	14	7.5 d-f	6.0 h-j	6.0 ij	5.5 k-m	6.3 e-g
3	Daconil Ultrex 3.8 oz + Aliette Signature 4 oz	14	9.0 a	8.8 ab	9.0 a	8.5 ab	7.5 bc
4	Daconil Ultrex 1.9 oz	14	7.8 c-f	7.8 c-e	7.3 d-f	7.0 e-g	6.5 d-f
5	Aliette Signature 2 oz	14	7.8 c-f	6.0 h-j	6.5 g-i	5.8 j-l	6.0 fg
6	Daconil Ultrex 1.9 oz + Aliette Signature 2 oz	14	9.0 a	7.8 c-e	7.5 c-e	7.3 d-f	6.8 de
7	Aliette Signature 4 oz + Chipco 26GT 4 fl oz	14	8.8 ab	9.0 a	8.3 b	8.8 a	8.3 a
8	Fore Rainshield 8 oz + Fosphite 8 fl oz	14	8.5 a-c	7.5 d-f	7.0 e-g	6.0 i-k	6.0 fg
9	Fore Rainshield WSP 8 oz + Aliette Sig. 4 oz	14	8.5 a-c	8.0 b-e	7.3 d-f	6.8 f-h	6.3 e-g
10	Daconil Ultrex 3.5 oz + Aliette Signature 4 oz	14	8.1 a-e	8.5 a-c	9.0 a	8.0 bc	6.8 de
11	Fosphite 8 fl oz	14	8.0 b-e	7.3 e-g	7.0 e-g	6.0 i-k	6.3 e-g
12	Heritage 0.4 oz + Daconil Ultrex 3.2 oz + Aliette Signature 4 oz	28	9.0 a	8.8 ab	9.0 a	8.8 a	7.8 ab
13	Heritage 0.4 oz + Daconil Ultrex 3.2 oz	28	9.0 a	9.0 a	9.0 a	8.0 bc	7.0 cd
14	Macro Sorb 2 oz	14	6.5 g	6.0 h-j	6.5 g-i	5.8 j-l	6.3 e-g
15	WAC79 2 fl oz + Dac Ultrex 3.8 oz	14	8.8 ab	8.8 ab	8.3 b	7.5 c-e	7.0 cd
16	WAC79 3 fl oz + Dac Ultrex 3.8 oz	14	8.0 b-e	8.3 a-d	7.8 b-d	7.5 c-e	6.8 de

17	WAC79 4 fl oz + Dac Ultrex 3.8 oz	14	8.0 b-e	8.3 a-d	7.8 b-d	7.8 cd	7.0 cd
18	WAC79 2 fl oz + Protect T/O 5 oz	14	7.3 e-g	6.3 hi	6.5 g-i	5.5 k-m	6.0 fg
19	WAC79 3 fl oz + Protect T/O 5 oz	14	7.3 e-g	6.3 hi	6.5 g-i	6.0 i-k	6.0 fg
20	WAC79 4 fl oz + Protect T/O 5 oz	14	8.3 a-d	6.5 gh	6.3 h-j	6.3 h-j	6.0 fg
21	WAC79 2 fl oz + 3336 WP 4 oz	14	7.5 d-f	6.0 h-j	7.0 e-g	6.0 i-k	5.8 g
22	WAC79 3 fl oz + 3336 WP 4 oz	14	7.6 c-f	6.8 f-h	7.0 e-g	6.5 g-i	6.3 e-g
23	WAC79 4 fl oz + 3336 WP 4 oz	14	8.0 b-e	6.3 hi	6.8 f-h	6.0 i-k	5.8 g
24	MKP 5# / acre	7	7.0 fg	5.5 ij	6.3 h-j	5.0 m	6.5 d-f
25	Daconil Ultrex 1.5 oz + MKP 5# / acre	7	8.8 ab	9.0 a	8.0 bc	7.8 cd	8.0 ab
26	Chipco 26GT 2 oz (Control) <sup>b</sup>	21	NA	6.8 f-h	6.5 g-i	7.0 e-g	6.3 e-g
27	MacroSorb 2 oz + Daconil Ultrex 3.8 oz	14	NA	6.0 h-j	6.8 f-h	7.0 e-g	7.0 cd
28	Untreated Control	--	8.0 b-e	5.3 j	5.8 j	5.3 lm	6.0 fg

<sup>a</sup>Treatment means followed by the same letter do not significantly differ (LSD,  $p = 0.05$ ).

<sup>b</sup>Chipco 26GT applied on 26 July and was added as a new treatment at that time.