

EVALUATION OF FUNGICIDES FOR CONTROL OF POWDERY MILDEW IN KENTUCKY BLUEGRASS IN CENTRAL OREGON, 2000

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Abstract

Fungicides were evaluated for control of powdery mildew in two commercial Kentucky bluegrass seed fields near Madras, Oregon. Adjacent sets of plots were established in both fields for application at the first sign of the disease and after moderate levels of the disease had developed. Fungicides were reapplied to the early plots once they began losing their effectiveness. All fungicides significantly reduced powdery mildew compared to untreated plots, and generally provided similar disease control. However, there were significant differences between fungicide performance on some evaluation dates, with Quadris plus Microthiol providing less control and Tilt alone or in combination with Microthiol or Rally (Laredo) alone providing better control than other fungicide treatments.

Introduction

Fungicides were evaluated for control of powdery mildew in Kentucky bluegrass during 1998 and 1999. The new fungicides Quadris, Folicur, and Rally (Laredo) were compared to industry standards and other registered fungicides. During 2000 the first objective was to evaluate the fungicides, some of which were applied in combination with sulfur (Microthiol), applied at the first sign of disease infection. The second objective was to evaluate fungicides applied after moderate levels of powdery mildew had developed, as in previous years. In addition to plots being evaluated separately, the performance of fungicides could be evaluated for differences in application timing

Methods and Materials

Fungicides were evaluated for control of powdery mildew in commercial fields of Kentucky bluegrass ('Merit' and 'Geronimo') grown for seed near Madras, Oregon. The fungicides Rally (Laredo), Tilt, Stratego, Folicur, Bayleton, and Quadris plus Microthiol were applied to 10-ft x 25-ft plots replicated four times in a randomized complete block design.

One set of plots was treated at the first sign of disease on April 8, and again on May 19 when the disease began to reappear. Treatments for the first and second applications were the same except for treatments 3 and 4, which were initially treated with Tilt but were followed by Quadris at 6 oz/acre plus Microthiol and Quadris at 9 oz/acre plus Microthiol, respectively. The second set of plots (adjacent to the first plots in the same two fields) were treated April 26 once powdery mildew was established. All fungicide treatments were applied with TeeJet 8002 nozzles on a 9-ft, CO₂-pressurized, hand-held boom sprayer at 40 psi and 20 gal of water/acre. Crop oil concentrate at 1 percent volume/volume was applied with fungicides to the first set of plots, while Sylgard 309 was applied at 0.25 percent volume/volume with fungicides to the second set of plots.

Plots were evaluated with a rating scale from 0 to 5, with 0 being no mildew present and 5 indicating total coverage. Since the first set of plots were treated at the first sign of disease, no pretreatment evaluations were made. These plots were evaluated April 17, April 24, May 2, May 10, May 18, May 26, and June 2. The second set of plots were evaluated before treatment April 25 and following treatment on May 3, May 10, May 17, May 24, and May 30.

Results and Discussion

In the early applications (Tables 1, 2) all fungicides significantly reduced disease compared to untreated plots. All fungicides provided similar protection. On some evaluation dates there were significant differences between fungicides, with Quadris plus Microthiol providing less control and Tilt alone or in combination with Microthiol and Rally (Laredo) applications providing better control than other fungicide treatments. Fungicides remained effective 32 days after treatment, but performance was eroding by 40 days after treatments so follow-up treatments were applied. There was some evidence that Tilt applied in combination with Microthiol performed slightly (nonsignificantly) better than Tilt alone. No change in disease control was observed when Tilt was followed by Quadris plus Microthiol rather than a second Tilt application. However, there could be management reasons for using products with different modes of action.

Fungicides applied after disease establishment (Tables 3, 4) all significantly reduced disease compared to the untreated plots, and all provided similar protection. Fungicides in these plots, where application was delayed until powdery mildew had developed to moderate levels, had begun losing effectiveness by 34 days after treatment.

Table 1. Powdery mildew ratings¹ on Kentucky bluegrass ('Merit') near Madras, Oregon following fungicide application on April 8 and reapplication May 19, 2000.

Treatment ²	Rate (product/acre)	Evaluation dates													
		April 17		April 24		May 2		May 10		May 18		May 26		June 2	
Quadris + Microthiol	6 oz + 5 lb	0.48	b	0.31	b	0.15	b	0.33	b	0.48	b	0.52	b	0.75	b
Quadris + Microthiol	9 oz + 5 lb	0.39	b	0.33	b	0.21	b	0.21	b	0.44	b	0.27	b	0.54	b
Tilt	6 fl oz	0.44	b	0	c	0	b	0.02	b	0.42	b	0.25	b	0.36	b
Quadris + Microthiol	6 oz + 5 lb														
Tilt	6 fl oz	0.46	b	0.04	c	0	b	0.11	b	0.40	b	0.21	b	0.27	b
Quadris + Microthiol	9 oz + 5 lb														
Tilt	6 fl oz	0.40	b	0.09	c	0	b	0.06	b	0.19	b	0.11	b	0.13	b
Tilt + Microthiol	6 fl oz + 5 lb	0.24	b	0.05	c	0	b	0	b	0.17	b	0.10	b	0.06	b
Stratego	10 fl oz	0.23	b	0.08	c	0	b	0.08	b	0.54	b	0.25	b	0.19	b
Rally	10 oz	0.45	b	0.05	c	0	b	0	b	0.17	b	0.15	b	0.04	b
Untreated		1.05	a	1.11	a	1.17	a	2.13	a	2.38	a	2.46	a	3.25	a

¹Rating scale was 0-5, with 0 = no mildew and 5 = the leaves completely covered.

²All treatments applied with Sylgard 309 at 1 qt/100 gal.

³Mean separation with Student-Newman-Kuels Test at P < 0.05.

2. Powdery mildew ratings¹ on Kentucky bluegrass C'Geronimo' near Madras, Oregon following fungicide application on April 8 and reapplication May 19, 2000.

Treatments ²	Rate (product/acre)	Evaluation dates												
		April 17	April 24	May 2	May 10	May 18	May 26	June 2						
Quadris + Microthiol	6 oz + 5 lb	0.59	0.80	Ab ³	0.56	b	0.46	b	0.98	b	0.88	b	0.88	b
Quadris + Microthiol	9 oz + 5 lb	0.56	0.29	b	0.29	b	0.36	b	0.48	b	0.65	b	0.85	b
Tilt	6 fl oz	0.45	0.25	b	0.02	b	0.02	b	0.44	b	0.65	b	0.44	be
Quadris + Microthiol	6 oz + 5 lb													
Tilt	6 fl oz	0.21	0.04	b	0	b	0.04	b	0.29	b	0.22	b	0.28	bc
Quadris + Microthiol	9 oz + 5 lb													
Tilt	6 fl oz	0.54	0.16	b	0	b	0.04	b	0.33	b	0.36	b	0.21	c
Tilt + Microthiol	6 floz+5 lb	0.44	0.19	b	0	b	0	b	0.23	b	0.13	b	0.15	c
Stratego	10 fl oz	0.53	0.31	b	0.10	b	0.09	b	0.37	b	0.48	b	0.33	bc
Rally	10 oz	0.38	0.08	b	0	b	0.02	b	0.38	b	0.40	b	0.15	c
Untreated	----	0.99	1.29	a	1.44	a	1.65	a	2.15	a	2.65	a	2.67	a

ns

¹Rating scale was 0-5, with 0 = no mildew and 5 = the leaves completely covered.

²All treatments applied with Sylgard 309 at 1 qt/100 gal.

³Mean separation with Student-Newman-Kuels Test at P < 0.05.

Table 3. Powdery mildew ratings on Kentucky bluegrass ('Merit') near Madras, Oregon following fungicide application on April 26, 2000.

Treatment ²	Rate (product/acre)	Evaluation dates										
		April 25	May 3	May 10	May 17	May 24	May 30					
		(pre-trtmt)										
Rally	8 oz	1.20	0.53	B ³	0.17	b	0.02	b	0	b	0.19	bc
Rally	10 oz	1.29	0.75	ab	0.17	b	0.02	b	0	b	0.06	c
Tilt	4 fl oz	1.11	0.61	ab	0.17	b	0	b	0.08	b	0.38	bc
Tilt	6 fl oz	1.20	0.74	ab	0.19	b	0.02	b	0	b	0.19	bc
Stratego	8 fl oz	1.06	0.40	b	0.13	b	0.06	b	0.11	b	0.19	be
Stratego	10 fl oz	1.11	0.51	b	0.11	b	0.02	b	0.04	b	0.52	bc
Folicur	6 fl oz	1.30	0.80	ab	0.29	b	0.04	b	0.19	b	0.84	b
Bayleton	4 oz	1.20	0.81	ab	0.13	b	0.06	b	0.02	b	0.32	be
Untreated		1.30	1.06	a	1.67	a	2.15	a	2.81	a	2.73	a
		ns										

¹Rating scale was 0-5, with 0 = no mildew and 5 = the leaves completely covered.

²All treatments applied with Sylgard 309 at 1 qt/100 gal.

³Mean separation with Student-Newman-Kuels Test at P < 0.05.

Table 4. Powdery mildew rating on Kentucky bluegrass ('Geronimo') near Madras, Oregon following fungicide application on April 26, 2000.

Treatments ²	Rate (product/acre)	Evaluation dates								
		April 25 (pre-trtmt)	May 3	May 10	May 17	May 24	May 30			
Rally	8 oz	1.2	0.99	0.90	0.29	B ³	0.13	b	0.46	b
Rally	10 oz	0.95	0.86	0.33	0.23	b	0	b	0.17	b
Tilt	4 fl oz	1.31	1.15	0.83	0.42	b	0.25	b	0.47	b
Tilt	6 fl oz	1.34	1.19	0.98	0.71	b	0.33	b	0.38	b
Stratego	8 fl oz	1.30	0.95	0.50	0.34	b	0.10	b	0.50	b
Stratego	10 floz	1.39	0.90	0.46	0.23	b	0.08	b	0.34	b
Folicur	6 fl oz	1.18	1.03	0.65	0.23	b	0.15	b	0.33	b
Bayleton	4 oz	1.41	1.20	0.85	0.56	b	0.27	b	0.31	b
Untreated	----	1.06	1.06	1.19	1.21	a	1.52	a	1.96	a
		NS	NS	NS						

¹Rating scale was 0-5, with 0 = no mildew and 5 = the leaves completely covered.

²All treatments applied with Sylgard 309 at 1 qt/100 gal.

³Mean separation with Student-Newman-Kuels Test at $P < 0.05$.