

**1998-99 FUNGICIDE REPORT**  
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**Melting Out Fungicide Trial, 1999**

The 1999 melting out (*Dreschlera poae*) fungicide trial was conducted at the Hancock Turfgrass Research Center on the MSU campus in E. Lansing, MI on irrigated Kenblue Kentucky bluegrass (*Poa pratensis*) turf maintained at 1 ½ " height of cut. The study area was fertilized in late 1998 at 1 lb nitrogen per 1000 sq ft and on May 31, 1999 and June 9 at 0.125 lb nitrogen per 1000 sq ft.

Treatments were applied to 4 replicate plots in a random complete block design using a CO powered backpack small plot sprayer operating at 32 PSI and a volume of 48 GPA. We utilized a double nozzle boom with 8002E flat fan nozzles. Preventive applications were made initially on May 9, with subsequent applications being made at the intervals cited in the data table.

At the time of the rating (June 17, 1999), the 10 day treatment had been applied four times (5/9, 5/20, 5/29, 6/8), the 14 day treatments had been applied three times (5/9, 5/23, 6/5), and the 21 day treatments had been applied twice (5/9, 5/29).

As the data indicates ( table 1), all treatments gave statistically significant control of melting out when compared to the untreated controls. Disease pressure was moderate this year due to a warm, relatively dry spring. Therefore, treatment separation related to subtle rate and interval differences was not evident.

No quality differences were evident, nor was any phytotoxicity observed at any time during the study duration.

*Table 1. Melting Out Ratings – 1999*

Rating Scale: 1 = less than 10% of leaves infected, with no thinning or discoloration, 10 = 100%of leaves infected with severe thinning and browning.

Rating Date: June 17, 1999

<u>Treatment</u>	<u>Rate per 1000 ft<sup>2b</sup></u>	<u>Interval (days)</u>	<u>Mean (LSD - .05)<sup>a</sup></u>
Ch. 26GT	4 fl oz	21	1.3 A
Polyoxorim-Zn	4 oz	14	1.3 A
Polyoxorim-Zn	8 oz	14	1.3 A
Daconil Ultrex	3.7 oz	10	1.5 A
Polyoxorim-Zn	8 oz	21	2.0 A
Polyoxorim-Zn + non-ionic surfactant	4 oz + 0.25%v/v	14	2.0 A
Compass	0.15 oz	14	2.0 A
Compass	0.1 oz	14	2.0 A
Control	—	—	4.5 B

<sup>a</sup>Treatments followed by the same letter are not significantly different from each other (Least Significant Differences Test - .05).

<sup>b</sup>R.ates are formulated product.

**TAKE-ALL PATCH FUNGICIDE TRIALS, 1999**

The 1999 take-all (*Gaeumannomyces graminis*) fungicide studies were established on irrigated creeping bentgrass (*Agrostis palustris* Huds.) fairways on the Whittaker Woods Golf Course in New Buffalo, MI, and on the Lynx Golf Course in Otsego, MI. The duplicate studies were laid out in a randomized complete block design with 4 replications, and a plot size of 6' x 18'. This larger plot size was

necessary because take-all patch symptoms are often dispersed. Treatments were applied with a CO backpack sprayer at 32 psi and volume of 96 GPA. Both golf courses were monitored for disease<sup>2</sup> beginning in April 1999 in the hope that the spring take-all outbreaks of the two previous years would be observed again this year.

The plot areas were fertilized lightly (May through September) and a granulated lime product (Nutralime) was applied monthly in an attempt to increase take-all patch severity. When no spring/early summer disease activity was observed, we initiated preventive applications in mid-August in an attempt to obtain disease control data during the cool weather of the fall, when take-all outbreaks are common.

The study areas were sprayed with low rates of Daconil Ultrex as needed to manage dollar spot.

Whittaker Woods Golf Course, New Buffalo, MI.

Despite a multi-year history of take-all patch in this plot area, no disease was observed in this study this year. Therefore, no data was available. No phytotoxicity was observed from any treatment in this study this season.

Lynx Golf Course, Otsego, MI.

As at Whittaker Woods, no disease occurred on this perennially infected fairway this season. In late May, however, a disease outbreak was observed on a nearby fairway and a curative fungicide study was quickly established. The plots were rated for existing disease and treatments were applied once, on May 28. Curative data was collected 14 days later (Table 2).

As the data indicates, disease pressure abated after the treatments were applied, with the control plots recovering at approximately one-half the rate of the most efficacious treatment. Under these circumstances, many of the products tested (Chipco Triton, Compass, Heritage, TADS 12529) provided statistically significant turf recovery compared to the untreated control. Mild phytotoxicity was noticed in the Banner MAXX (3 oz/1000ft<sup>2</sup>) treatment plots, which probably explains the lack of recovery in this normally efficacious treatment. Many treatments (TADS 12592, Chipco Triton), appeared to be more efficacious curatively when used at the lower rates. We have no explanation for this result, since no phytotoxicity was observed associated with these treatments.

**Table 2. Take-All Patch Curative Fungicide**

Rating Scale: Mean percent recovery/treatment from pre-treatment disease levels.

Rating Date: June 11, 1999

<u>Treatment</u>	<u>Rate/1000ft<sup>2</sup><sup>b</sup></u>	<u>Mean % Recovery / (LSD-.05)<sup>ac</sup></u>
Chipco Triton	0.5 fl oz	88.5 A
Compass + Banner MAXX	0.25 oz + 2 fl. oz.	78.5 AB
Compass + Banner MAXX	0.2 oz + 2 fl oz	74.5 ABC
Compass	0.25 oz	72.0 ABC
TADS 12529	4.25 gm	69.0 ABC
Heritage	0.545 lb ai/A	64.8 BC
Chipco Triton	1 fl oz	64.5 BCD
Banner MAXX	3 fl oz	62.0 BCD
TADS 12529	8.5 gm	54.5 CD
Control	—	42.0 D

<sup>a</sup> Treatments followed by the same letter are not significantly different from each other (Least Significant Difference Test - .05).

<sup>b</sup> Rates are formulated product, unless cited otherwise.

<sup>c</sup> Mean of 4 replicate plots.

## Summer Patch Fungicide Trials, 1999

Fungicide studies for the preventive control of summer patch (*Magnaporthe poae*) on annual bluegrass (*Poa annua*) were established on two suburban Detroit golf courses on irrigated fairways which had a history of summer patch infection. All treatments were applied to four replicate 6'x 9' plots prior to disease occurrence (except as cited in the data table), with re-application taking place at protocol intervals. Plot design, application procedures, and equipment were as previously described in this report, except that the application volume was 96 GPA, or as noted in the data table.

### Dearborn Country Club, Dearborn, MI

Treatments were initiated on May 10 (65<sup>0</sup>) or on June 7 (75<sup>0</sup>), or as cited in the data (table 3). The 65<sup>0</sup> treatments were re-applied on June 9 and the 75<sup>0</sup> treatments were re-applied on July 2, except as noted in the data table. The study was fertilized on May 10 (22-4-7 at ½ lb N/1000ft<sup>2</sup>), June 1 (22-4-7 at ½ lb N/1000ft<sup>2</sup>), June 21 (22-4-7 at ¼ lbN/1000ft<sup>2</sup>), and July 12 (22-4-7 at ¼ lbN/1000ft<sup>2</sup>). Disease and quality ratings were taken on August 16, at the peak of disease development.

As the data (table 3) indicate, disease pressure was moderate this year. Under this scenario, most of the treatments gave statistically significant control of summer patch, compared to the untreated control. Many of the standard treatments, such as Sentinel, Heritage, Eagle, and Banner gave virtually complete control of the disease.

3336 F was applied as a curative treatment, alone, and as a component of sequential combination treatments, in early August, when disease pressure was just developing in the control plots. Unfortunately, disease pressure abated in mid-late August, less than a month after disease pressure had become severe enough to test the curative efficacy of 3336 F. This declining disease pressure allowed both the controls and the curatively-treated plots to recover simultaneously, invalidating any recovery data.

No phytotoxicity was observed in the plot area this year.

Table 3. Summer Patch Fungicide Ratings, 1999

Rating Scale: Percent plot area infected

Rating Date: Aug. 16, 1999

<b>Treatment</b>	<b>Rate/1000ft<sup>2</sup> (formulation)</b>	<b>Interval<sup>a</sup> (Days)</b>	<b>Mean<sup>f</sup></b>	<b>LSD (5%)</b>
Heritage	0.2 oz	65°, then 14	0	H
3336 F	6 fl oz	14 (curative)	8.5	B-D
Heritage, then 3336 F <sup>b</sup>	0.2 oz 6 oz	75°, then 21 14	0	H
WAC 79, then 3336 F <sup>b</sup>	5 fl oz 6 oz	75°, then 14 14	8.25	B-E
Compass <sup>d</sup>	0.2 oz	75°, then 14	2.5	D-H
Compass + Banner MAXX <sup>d</sup>	0.25 + 2 fl oz	75°, then 21	3	C-H
Banner Maxx <sup>d</sup> , then Compass <sup>cd</sup>	4 fl oz 0.25 oz	75° (one app) 14	1.5	E-H
Banner Maxx <sup>d</sup> , then Compass <sup>cd</sup>	4 fl oz 0.25 oz	75° (one app) 28	3.75	C-H
Compass <sup>d</sup>	0.4 oz	75°, then 28	3.5	C-H
Compass	0.25 oz	75°, then 14	2.5	D-H
Compass <sup>e</sup>	0.25 oz	75°, then 14	4.25	C-H
Compass	0.25 oz	75°, then 28	3.25	C-H
Compass <sup>e</sup>	0.25 oz	75°, then 28	5.75	B-H
Eagle	0.6 oz	75°, then 14	0	H
Eagle	1.2 oz	75°, then 28	0.75	GH
Chipco Triton	0.5 fl oz	75°, then 28	8.5	B-D
Chipco Triton	1 fl oz	75°, then 28	8.5	B-D
Chipco Triton	1.5 fl oz	75°, then 28	4.25	C-H
TADS 12529	4.25 g	75°, then 28	12	AB
TADS 12529	8.5 g	75°, then 28	9.5	A-C
Heritage	0.2 oz	75°, then 28	0.75	GH
Sentinel	0.25 oz	75°, then 28	1.25	F-H
Bayleton	2 oz	65°, then 28	8	B-F
Banner Maxx	4 fl oz	75°, then 28	0.5	H
Control	—	—	16.25	A
Chipco Triton	0.5 fl oz	65°, then 28	5	C-H
Chipco Triton	1 fl oz	65°, then 28	4.5	C-H
Chipco Triton	1.5 fl oz	65°, then 28	6.5	B-H
TADS 12529	4.25 g	65°, then 28	7.5	B-G
TADS 12529	8.5 g	65°, then 28	6	B-H
Heritage	0.2 oz	65°, then 28	2.25	D-H
Heritage	0.4 oz	75°, then 28	0	H

<sup>a</sup> Reapplication interval

<sup>b</sup> 3336 F treatments at 14 day intervals replaced Heritage and WAC 79 when disease appeared in controls.

<sup>c</sup> Compass applied 28 days after initial Banner MAXX application.

<sup>d</sup> Applied in 3 gallon/ 1000 ft<sup>2</sup> spray volume.

<sup>e</sup> Applied in 4 gallon/1000 ft<sup>2</sup> spray volume.

<sup>f</sup> Treatments followed by the same letter are not significantly different from each other (Least Significant Differences Test - .05).

### Twin Beach Golf Club, W. Bloomfield, MI

The study described above was duplicated on the Twin Beach Golf Club on an irrigated annual bluegrass fairway that has a history of disease. Treatments were applied initially on May 10 (65° F at 2" soil depth) and on June 4 (75° F at 2" soil depth). The 65° treatment was re-applied on June 9, while the 75° treatments were re-applied on July 6, except as noted in the data table. Because the plot area appeared fertile in May, fertilizer was first applied on June 21 (22-4-7 at ¼ lbN/1000ft<sup>2</sup>). The same fertilizer treatment was re-applied on July 6 and August 2.

Unfortunately, summer patch disease did not develop in this study this year. The reason for this lack of disease is unclear, since we experienced adequate heat stress and the fairway was comprised primarily of annual bluegrass. Therefore, no data was available from this study. No phytotoxicity was observed in this study.

### **DOLLAR SPOT FUNGICIDE TRIAL, 1999**

This test was conducted at the Hancock Turfgrass Research Center, E. Lansing, MI on an irrigated Pennlinks creeping bentgrass, simulated, putting green. Plots were mowed at 0.25" and were fertilized at approximately 3/8 lb. nitrogen per 1000 ft<sup>2</sup> per month. The study was laid out in 4 replications of 2'x6' plots in a random block design. Applications were made using a hand held single nozzle (TeeJet 8002E) CO<sub>2</sub> sprayer operating at 33 PSI and a volume of 48 GPA.

As of the 9/22 rating in the table below, the 14 day treatments had been applied four times (8/2, 8/16, 8/31, 9/14), the 21 day treatments had been applied three times (8/2, 8/25, 9/14) and the 28 day treatments had been applied twice (8/2, 8/31). Exceptions are noted in the table. As the disease ratings indicate, most of the standard products performed well under the moderate disease pressure we experienced this season. Data were subjected to analysis of variance and the LSD test (.05).

No chemical phytotoxicity was observed this year, and turf quality was actually enhanced in some treatments (table 4).

Table 4. Dollar Spot Ratings, 1999.

Treatment	Rate <sup>b</sup>	Int. <sup>a</sup> (Days)	Mean % Dollar Spot <sup>c</sup> , LSD - .05, ( Mean Turfgrass Quality - 0 = worst, 10 = best, 7=acceptable) <sup>d</sup>			
			8/24	8/31	9/14	9/22
Lynx 45WP	0.278 oz	14	7 DE	10 BC (6.8)	0.1 G (7.8)	0 F (7.3)
Lynx 45WP	0.556 oz	21	0.3 FG	0.4 BC (7.5)	0 G (7.5)	0 F (7.8)
Lynx + Dac. Ultrex	0.278 oz	14	0 G	0 E (8.3)	0 G (8.0)	0 F (7.8)
	+ 1.82 oz					
Bayleton 50WP + Dac. Ultrex	0.25 oz + 1.82 oz	14	0.1 FG	0 E (7.8)	0 G (8.0)	0 F (7.8)
Lynx 45WP + Heritage	0.278 oz + 0.2 oz	21	5.1 EF	2.6 DE (6.5)	0 G (8.0)	0 F (7.5)
Bayleton 50W + Heritage	0.25 oz + 0.2 oz	21	0.1 FG	0.1 E (7.8)	0 G (7.8)	0 F (7.3)
Spectro 90WG	4 oz	14	0.3 FG	0.1 E (7.5)	0 G (8.0)	0 F (8.0)
WAC 79	10 fl oz	14	11 CD	11.8 BC(6.5)	9.3 E (6.8)	9.3 DE (6.5)
WAC 79	5 fl oz	14	26.3 A	27.5 A (5.8)	17.5 BC (6.0)	18.5 AB (6.8)
WAC 79 + 3336F	5 fl oz + 2 fl oz	14	16.3 B	15.0 B (6.5)	13.8 CD (6.8)	16.3 B (6.8)
WAC 79 + Dac. Ultrex	5 fl oz + 1.98 fl oz	14	0.4 FG	0.9 E (7.3)	0 G (7.8)	0 F (7.5)
GX-611 720 F	4.2 fl oz	14	0.5 FG	0 E (7.8)	0 G (8.0)	0 F (8.0)
Eagle	0.5 oz	14	0 G	0 E (8.0)	0 G (8.3)	0 F (7.8)
Eagle	0.6 oz	14	0 G	0 E (7.5)	0 G (8.0)	0 F (7.8)
Eagle	1 oz	28	0.1 FG	0.9 E (7.5)	0 G (8.0)	0 F (7.8)
Maximum	8 oz	14	0 G	0 E (7.8)	0 G (8.0)	0 F (7.8)
Chipco Triton	0.5 fl oz	14	0 G	0 E (7.3)	0 G (7.8)	0 F (7.3)
Chipco Triton	1 fl oz	14	0 G	0 E (7.5)	0 G (8.0)	0 F (7.8)
Ch. 26 GT	4 fl oz	14	0 G	0 E (7.0)	0 G (7.0)	0 F (7.0)
Ch .Al. Sign.	8 oz	14	12.5BC	14.8 B (8.8)	10.3 DE(7.5)	1.3 CD (7.3)
Ch. 26 GT. + Ch. Al. Sign	4 fl oz + 8 oz	14	0 G	0 E (7.8)	0 G (8.5)	0 F (8.3)
Eminent125SL	2 fl oz	14	0 G	0 E	0 G (7.8)	0 F (7.8)
Eminent125SL	4 fl oz	14	0 G	0 E	0 G (8.0)	0 F (8.0)
Eminent125SL	4 fl oz	21	0 G	0 E	0 G (7.5)	0 F (8.0)
Echo 75 WDG	4.2 oz	14	0 G	0 E	0 G (8.5)	0 F (8.0)
Thalonil 4L	6.2 fl oz	14	0 G	0 E	0 G (7.8)	0 F (8.0)
Dac. Ultrex	3.8 oz	14	0 G	0 E	0 G (8.5)	0 F (8.0)
Dac. Ultrex + Heritage	3.8 oz + 0.2 oz	14	0 G	0 E	0 G (8.5)	0 F (8.0)
Control	—	—	27.5 A	26.3 A	22.5 A (6.5)	A (6.8)

<sup>a</sup> Re-application interval.

<sup>b</sup> Rates represent formulated product.

<sup>c</sup> Average of 4 replicate plots.

<sup>d</sup> Treatments followed by the same letter are not significantly different from each other (Least Significant Differences Test - .05).

## Pythium Blight Fungicide Trial, 1999

This study was conducted at the Hancock Turfgrass Research Center on the MSU campus, E. Lansing, MI on a stand of perennial ryegrass. The turf was mowed at 1.5 inches, heavily irrigated beginning in mid-June and for the duration of the study, and fertilized monthly with 1# nitrogen 1000 sq ft<sup>-1</sup> beginning in May. The study was set up in a randomized complete block design with plots measuring 2' x 4.5' with 0.5' alleys. Four replications of each treatment were included. Fungicide treatments were applied beginning on July 2 and were reapplied according to the intervals listed in the table below with 7 day treatments being applied 6 times and 14 day treatments 3 times between July 2 and August 6. Applications were made using a hand held CO<sub>2</sub>-powered backpack sprayer at 36 psi with a single 8002E flat fan TeeJet nozzle at a rate of 48 GPA. The test area was inoculated with *Pythium* sp. growing on a sand/cornmeal mixture on July 15, 21, and 27 using a drop spreader at a rate of 2.5# 1000 sq ft<sup>-1</sup>. Plots were covered with a blue vinyl tarp and/or opaque plastic trays during periods when the weather was conducive for disease development. On July 24, Prostar was applied over the entire study area for the control of brown patch. Ratings were taken of the % area blighted of the covered portion of each plot and were recorded. Data were subjected to analysis of variance and LSD test at the 5% level.

Disease pressure was quite severe this year with our control plots approaching a 90% disease average in the covered portion of the plots. Chipco Aliette Signature 80 WG provided significant disease control during the study compared to the control. Other treatments which provided significant control compared to the control plots at one or the other rating dates include Koban, Heritage, WAC 90 + Protect T/O, and WAC 90 alone. It is unclear why some standard fungicide treatments failed in this trial.

Table 5. 1999 *Pythium* Blight Ratings

<u>Treatment</u>	<u>Rate/1000 ft<sup>2</sup></u>	<u>Interval<sup>b</sup></u> <u>(Days)</u>	<u>% Pythium blight<sup>a</sup></u>	
			<u>29-Jul</u>	<u>2-Aug</u>
Koban <sup>d</sup>	5 oz	14	13.8 C <sup>c</sup>	78.8 A-C
Ch. Al. Sig.	4 oz	14	17.5 C	50 E
WAC 90 + Protect t/o	2 fl oz + 8 oz	14	23.8 BC	68.8 A-E
WAC 90	2 fl oz	14	27.8 A-C	58.8 C-E
Heritage	0.4 oz	14	31.3 A-C	58.8 C-E
Junction + Subdue Maxx <sup>e</sup>	4 oz + 0.5 fl oz	7	37.5 A-C	80 A-C
Junction	6 oz	7	42.5 A-C	85 AB
Banol	2 oz	14	45 A-C	77.5 A-C
Junction + Subdue Maxx <sup>e</sup>	6 oz + 0.5 fl oz	7	51.3 AB	76.3 A-D
Subdue Maxx	1 fl oz	14	51.3 AB	77.5 A-C
Junction 61.1 WDG	4 oz	7	56.8 A	87.5 AB
Junction	8 oz	7	58.8 A	92.5 A
Control	—	—	58.8 A	87 AB

<sup>a</sup>Numbers represent estimated % disease area of the covered portion of each plot. Means of four replications.

<sup>b</sup>Seven day interval treatments were applied on 7/2, 7/8, 7/15, 7/23, 7/30, 8/6 and 14 day treatments were applied on 7/2, 7/15, and 7/30.

<sup>c</sup>Means followed by the same letter do not significantly differ (LSD, p=0.05).

<sup>d</sup>Applied on 7/15 and 7/30 only.

<sup>e</sup>Received Subdue Maxx 4 days late (on 7/27) for 4<sup>th</sup> tank mix application only.

## Preventive Brown Patch Fungicide Trial, 1999

This was a preventive brown patch study conducted at the Hancock Turfgrass Research Center on the MSU campus, E. Lansing, MI on a stand of colonial bentgrass (*Agrostis tenuis*). The turf mowed at 1.5", irrigated heavily to encourage disease development, and fertilized monthly with 1# nitrogen 1000 ft<sup>2</sup>.



The study was set up in a randomized complete block design with four replications. Plots measured 2' x 4.5' with 0.5' alleys. Fungicide treatments were applied beginning on July 2 with subsequent applications made at intervals specified below. Seven day interval treatments were applied 6 times, 14 day treatments 3 times, and 21 and 28 day treatments were applied twice each. Fungicide applications were made using a CO - powered backpack sprayer with a single 8002E flat fan TeeJet nozzle at 36 psi and a rate of 48 GPA. The entire plot area was inoculated with *Rhizoctonia solani* growing on sand/cornmeal inoculum at 2.5# 1000 ft<sup>-2</sup> on June 22 and July 15 and 21. Plots were covered with a blue vinyl tarp and/or opaque plastic trays during periods when weather was conducive to disease development. On July 30, Koban was applied over the entire study area for the control of Pythium blight. Data collected were visual estimations of % plot area blighted. Data were analyzed using ANOVA and means separated with LSD (p=0.05.)

As can be seen in the table below, there were no significant differences between the control and any treatments on the 29 July rating date. However, on the 3 August rating date, many standards including Heritage, Fore, Compass and a Compass + Banner Maxx tankmix performed well. This study exhibited poor disease distribution with strong disease development in some areas and little pressure in others resulting in large amounts of disease variability.

Table 6. Preventive Brown Patch Ratings.

<u>Treatment</u>	<u>Rate/1000ft<sup>2</sup></u>	<u>Interval (Days)<sup>b</sup></u>	<u>% Brown patch<sup>a</sup></u>	
			<u>29-Jul<sup>c</sup></u>	<u>3-Aug</u>
Heritage	0.2 oz	14	0.6 b	1.0 h
Heritage	0.4 oz	28	1.6 b	2.0 gh
Compass 50 WG + Banner Maxx 50 WG	0.15 oz + 1 fl oz	21	2.6 b	5.8 f-h
Fore	4 oz	7	6.3 b	5.8 f-h
Eminent 125 SL	2 fl oz	14	8.5 b	6.0 e-h
Compass 50 WG	0.15 oz	14	11.0 ab	9.0 d-h
Compass 0.7 MEC	0.85 fl oz	14	4.9 b	9.3 d-h
Eminent 125 SL	4 fl oz	21	11.3 ab	10.3 c-g
3336 WP + Compass	2 oz + 0.1 oz	14	10.5 ab	10.5 c-g
Eminent 125 SL	4 fl oz	14	10.5 ab	11.8 b-f
RH-0611 (Maximum)	10 oz	14	6.4 b	13.5 a-f
3336 WP alternating w/ Compass	4 oz alt. 0.2 oz	14 alt 14	6.8 b	13.8 a-f
Dac. Ultrex	3.8 oz	14	10.5 ab	13.8 a-f
WAC 74 + 3336 WP	2 oz + 4 oz	14	9.3 b	15.0 a-e
Echo 75 WDG	4.2 oz	14	5.5 b	16.3 a-d
Control			11.8 ab	19.3 a-c
WAC 74	2 oz	14	21.3 a	20.0 ab
Spectro 90 WDG	4 oz	14	21.3 a	22.5 a

<sup>a</sup>Numbers represent the % plot area blighted. Mean of 4 replications.

<sup>b</sup>Seven day treatments were applied on 7/2, 7/8, 7/15, 7/23, 7/30, and 8/6, 14 day treatments on 7/2, 7/15, and 7/30, 21 day treatments on 7/2 and 7/23, and 28 day treatments on 7/2 and 7/30.

<sup>c</sup>Means followed by the same letter do not significantly differ (LSD, p=0.05.)

#### Curative Brown Patch Fungicide Trial, 1999

This study was a curative brown patch study conducted at the Hancock Turfgrass Research Center on the campus of MSU, E. Lansing, MI on a Pennlinks creeping bentgrass research green. The disease developed naturally without artificial inoculation. The green was mowed at 0.157", fertilized monthly with 0.5 lbs nitrogen 1000 ft<sup>-2</sup>, and watered as needed to maintain turf vigor. The study was set up in a randomized complete block design with 4 replications and plots which measured 2' x 4.5' with 6" alleys. Fungicide treatments were applied using a CO -powered backpack sprayer with a single 8002E flat fan nozzle at 36 psi at a rate of 48 GPA. Treatments were applied beginning on 24 July with subsequent applications made according to the intervals listed below. The final applications were made on 3 September. Seven-day treatments were applied 6 times, 14-day treatments 4 times, 21-day treatments 3



times, and the 28-day treatments twice. Plots were covered with a blue vinyl tarp as needed to encourage further disease development. Disease ratings were visual estimations of percent plot area blighted. An initial disease rating was taken on 24 July. Data were analyzed with repeated measures ANOVA with a covariate for the disease rating taken prior to treatment. Means were separated using LSD.

The 30 July rating was taken 6 DAT and several treatments including Prostar, Heritage, and Echo 75 WDG provided significant recovery compared to the untreated control plots. In addition, treatments such as Maximum, Compass, WAC 74 and 3336 WP tankmix and alternation with Compass provided significant recovery compared to the untreated control. By the 3 August rating (10 days after initial treatment), most treatments provided significantly faster recovery than the untreated control. Those treatments that provided the best curative control were Daconil Ultrex, Compass, 3336 WP alternated with and tank mixed with Compass, Fore, Heritage, Prostar, Eminent (4 fl oz), and Echo. None of these treatments were significantly different from each other. The turf was fully recovered 17 days after the initial treatments were applied.

Table 7. Curative Brown Patch Ratings

<u>Treatment</u>	<u>Rate/1000ft<sup>2</sup></u>	<u>Interval (Days)<sup>b</sup></u>	<u>% Brown patch<sup>a</sup></u>	
			<u>30-Jul<sup>c</sup></u>	<u>3-Aug</u>
Dac. Ultrex	3.8 oz	14	31.3 a-d	5.5 q
Compass 50 WG	0.15 oz	14	31.3 c-h	12.5 pq
Fore	4 oz	7	22.5 b-h	5.8 o-q
Heritage	0.2 oz	14	20.0 c-h	4.3 o-q
3336 WP alternating w/ Compass	4 oz alt. 0.2 oz	14 alt 14	26.8 c-h	11.3 o-q
Heritage	0.4 oz	28	15.0 d-l	4.0 n-q
Prostar	2.2 oz	14	22.5 c-k	11.8 m-q
Eminent 125 SL	4 fl oz	14	38.8 a	15.0 l-q
Echo 75 WDG	4.2 oz	14	16.3 c-l	6.3 j-q
3336 WP + Compass	2 oz + 0.1 oz	14 + 14	16.3 c-j	7.0 k-q
Compass 0.7 MEC	0.85 fl oz	14	26.3 -f	13.0 l-p
WAC 74 + 3336 WP	2 oz + 4 oz	14 +14	33.8 a-c	18.0 g-o
RH-0611 (Maximum)	10 oz	14	13.8 c-l	5.8 h-p
Eminent 125 SL	4 fl oz	21	25.5 a-e	11.8 g-o
Spectro 90 WDG	4 oz	14	25.8 b-f	17.5 g-n
Compass 50 WG + Banner Maxx 50 WG	0.15 oz + 1 fl oz	21 + 21	25.0 a-e	16.3 f-m
WAC 74	2 oz	14	11.0 c-k	9.0 e-m
Eminent 125 SL	2 fl oz	14	27.5 a-f	23.0 c-l
Control	—	—	32.5 ab	27.5 a-f

<sup>a</sup>Numbers represent the % plot area exhibiting disease symptoms. Mean of 4 replications.

<sup>b</sup>Seven day interval treatments were applied on 7/24, 8/10, 8/13, 8/20, 8/27, and 9/3, the 14 day treatments on 7/24, 8/10, 8/20, and 9/3, the 21 day treatments on 7/24, 8/13, and 9/3, and the 28 day treatments on 7/24 and 8/20.

<sup>c</sup>Means followed by the same letter do not significantly differ (LSD, p=0.05).

### Summer Stress Syndrome in Bentgrass, 1999

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 0.157" and fertility was as listed below with all applications being made on a 30-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. All treatments were applied on a 14-day interval. Treatments were applied using a CO backpack sprayer and a single 8002E tee-jet flat fan nozzle. All treatments were applied beginning on May 21, 1999. Chipco 26GT was applied to the entire plot area on 7/23 (2 oz.), 8/15 (4 oz.), and 8/31 (4 oz.) to prevent severe loss in our control plots due to dollar spot outbreaks. Quality ratings were taken using a 0 to 10 scale, where 0 = poor, 10 =excellent, and 7 = acceptable. Data were analyzed using ANOVA and means separated with LSD (p=0.05).

The Chipco Aliette Signature + Daconil Ultrex + fertilizer combination provided good turf quality

for the duration of the study. The Nutri-Grow P + K + Daconil Ultrex did not receive any additional nitrogen during this test and, during the month of July, the quality provided by this treatment was equivalent to that provided by the Chipco Alette Signature + Daconil Ultrex + fertilizer combination. Myconate treatments varied in their ability to improve turf quality over the course of the study. Early in the study, the Myconate + complete fertilizer treatments provided acceptable turf quality while the Myconate + IBDU fertilizer performed better late in the study as can be seen in the following tables.

Table 8. Bent Decline 1999 Quality Rating (0-10, 7 acceptable)

<u>Treatment</u>	<u>Rate/1000ft<sup>2</sup></u>	<u>Interval</u> <u>(days)<sup>a</sup></u>	<u>Quality<sup>b</sup></u>			
			<u>3-Jun</u>	<u>11-Jun</u>	<u>29-Jun</u>	<u>20-Jul</u>
Myconate + Terra Fert. (22-4-7)	3 g+ 0.5# N	14 + 30	7.8 A	7.3 B	8.3 B	7.0 C
Myconate + Terra Fert. (22-4-7)	6 g + 3.8 oz	14 + 30	7.5 AB	7.3 B	8.0 B	6.8 C
Myconate + IBDU Fert. (31-0-0)	3 g + 0.5# N	14 + 30	7.5 AB	7.0 B	8.0 B	7.3 BC
Myconate + IBDU Fert. (31-0-0)	6 g + 0.5# N	14 + 30	7.0 B	6.8 BC	7.8 BC	7.3 BC
IBDU Fert. (31-0-0)	0.5# N	30	7.0 B	6.8 BC	7.3 CD	7.5A-C
Terra Fert. (22-4-7)	0.5# N	30	7.8 A	7.3 B	8.0 B	6.8 C
Unfertilized Control	—	—	7.0 B	6.3 C	6.5 E	6.8 C
Nutri-Grow P+K + Dac. Ultrex	5 fl oz + 3.8 oz	14 + 14	7.0 B	6.3 C	7.0 DE	8.0 AB
Ch. Alette Signature + Dac. Ultrex + Terra Fert. (22-4-7)	4 oz + 3.8 oz + 0.5# N	14 + 14 + 30	7.5 AB	8.0 A	9.0 A	8.3 A

<sup>a</sup>Treatments applied on 14 day intervals were applied on the following dates: 5/21, 6/4, 6/18, 7/2, 7/16, 7/30, 8/11, 8/27, and 9/11.

<sup>b</sup>Treatment means followed by the same letter are not significantly different from each other (LSD, p=0.05.)

<sup>a</sup>Treatments applied on 14 day intervals were applied on the following dates: 5/21, 6/4, 6/18, 7/2, 7/16, 7/30, 8/11, 8/27, and 9/11. <sup>b</sup>Treatment means followed by the same letter are not significantly different from each other (LSD, p=0.05.)

Table 9. Bent Decline 1999 Quality Rating (0-10, 7 acceptable)

<u>Treatment</u>	<u>Rate/1000ft<sup>2</sup></u>	<u>Interval</u> <u>(days)<sup>a</sup></u>	<u>Quality<sup>b</sup></u>		
			<u>27-Jul</u>	<u>8-Aug</u>	<u>24-Aug</u>
Myconate + Terra Fert. (22-4-7)	3 g + 0.5# N	14 + 30	6.0 C	5.8 C	6.0 E
Myconate + Terra Fert. (22-4-7)	6 g + 3.8 oz	14 + 30	6.5 BC	6.3 BC	6.3 DE
Myconate + IBDU Fert. (31-0-0)	3 g + 0.5# N	14 + 30	6.8 BC	6.8 B	7.5 B
Myconate + IBDU Fert. (31-0-0)	6 g + 0.5# N	14 + 30	6.5 BC	6.8 B	7.0 BC
IBDU Fert. (31-0-0)	0.5# N	30	6.8 BC	6.3 BC	6.8 CD
Terra Fert. (22-4-7)	0.5# N	30	6.0 C	6.0 BC	6.0 E
Unfertilized Control	—	—	6.3 C	5.5 C	5.8 E
Nutri-Grow P+K + Dac. Ultrex	5 fl oz + 3.8 oz	14 + 14	7.3 AB	5.8 C	5.8 E
Ch. Alette Signature + Dac. Ultrex + Terra Fert. (22-4-7)	4 oz + 3.8 oz + 0.5# N	14 + 14 + 30	7.8 A	8.3 A	8.3 A

<sup>a</sup>Treatments applied on 14 day intervals were applied on the following dates: 5/21, 6/4, 6/18, 7/2, 7/16, 7/30, 8/11, 8/27, and 9/11.

<sup>b</sup>Treatment means followed by the same letter are not significantly different from each other (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 1.5" and fertility was as listed below with all fertilizer applications being made on a 30-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 backpack sprayer and a single 8002E tee-jet flat fan nozzle. All treatments were applied beginning on June 9, 1999 and were reapplied on June 23, July 7, July 22, August 4, August 19, and September 1. Fertilizer applications were made on July 7, August 4, and September 2. Chipco 26GT was applied to the entire plot area on June 23 (2 oz), July 7 (2 oz), July 23 (2 oz), and August 5 (4 oz) to prevent severe loss in our control plots due to dollar spot outbreaks. Quality ratings were visually estimated using a 0 to 10 scale, where 0 = poor, 10 = excellent, and 7 = acceptable. Data are presented in tables 10 – 11. Data were analyzed using ANOVA and means separated with LSD (p=0.05)

The Chipco Alette Signature + Daconil Ultrex + fertilizer combination provided good turf quality all season long and, for most of the season, this was significantly better quality than all of the other treatments in this test. The Nutri-Grow P + K + Daconil Ultrex combination did not receive nitrogen during the trial. The Nutri-Grow P + K + Daconil Ultrex provided good quality turf (July 27 – August 11) during the most stressful period of the summer when the control plots showed the poorest quality.

Table 10. Quality Rating (0-10, 7 acceptable)

<u>Treatment</u>	<u>Rate/1000ft<sup>2</sup></u>	<u>Interval (Days)</u>	<u>Quality<sup>a</sup></u>			
			<u>29-Jun</u>	<u>14-Jul</u>	<u>20-Jul</u>	<u>27-Jul</u>
Ch. Alette Signature + Daconil Ultrex + Terra Fert. (22-4-7)	4 oz + 3.8 oz + 0.5# N	14+ 30	7.3 AB	7.0 A	7.5 A	6.5 A
Nutri-Grow P+K + Dac. Ultrex	5 fl oz + 3.8 oz	14	6.5 AB	6.0 BC	6.3 B	6.0 AB
Unfertilized Control	—	—	6.3 B	5.8 BC	5.8 BC	5.8 BC
Terra Fert. (22-4-7) Control	0.5# N	30	6.0 B	5.3 C	5.3 C	5.3 C

Table 11. Quality Rating (0-10, 7 acceptable)

<u>Treatment</u>	<u>Rate/1000ft<sup>2</sup></u>	<u>Interval (Days)</u>	<u>Quality<sup>a</sup></u>			
			<u>3-Aug</u>	<u>11-Aug</u>	<u>17-Aug</u>	<u>24-Aug</u>
Ch. Alette Signature + Daconil Ultrex + Terra Fert. (22-4-7)	4 oz + 3.8 oz + 0.5# N	14+ 30	7.8 A	8.5 A	8.5 A	9.0 A
Nutri-Grow P+K + Dac. Ultrex	5 fl oz + 3.8 oz	14	6.5 B	7.3 B	6.8 B	7.5 B
Unfertilized Control	—	—	4.5 C	6.0 C	6.0 BC	7.0 BC
Terra Fert. (22-4-7) Control	0.5# N	30	4.0 C	5.0 D	5.3 C	5.8 C

<sup>a</sup>Means followed by the same letter are not significantly different (LSD, p=0.05).

## 1998-99 Snow Mold Fungicide Studies A and B

Two corporation-sponsored snow mold fungicide field studies were conducted during the fall and winter of 1998-99. Study A was applied on the Boyne Highlands Resort in Harbor Springs, MI on 28 Oct, 1998 (except where noted in Tables 12-13), and study B was applied on the Treetops/Sylvan Resort in Gaylord, MI on 30 Oct, 1998 (except as noted in Tables 1 - 4). Treatments were applied preventively to three replicate 6' x 9' (Boyne Highlands) or 3' x 9' (Treetops) creeping bentgrass (*Agrostis palustris*)/annual bluegrass (*Poa annua*) fairway plots where the turf was maintained at approximately 1/2" height of cut. Liquid treatments were applied with a CO backpack sprayer at a pressure of 36 psi and a volume of 100 GPA (except where noted in Tables 12-13). Granular products were pre-weighed and hand-applied.

Studies A and B were rated on 31 March 1999 immediately following snow cover melt off. The predominant snow mold species was *Typhula incarnata* at Boyne Highlands and *Typhula ishkariensis* at

Treetops. Microdochium patch (*Microdochium nivale*) was observed in some plots as indicated in Tables 12 and 13.

As indicated in the data tables, disease pressure was moderate at Boyne Highlands and severe at Treetops. Under the moderate disease conditions at Boyne Highlands, many treatments provided adequate disease control. Under the severe disease conditions at Treetops, most treatments, including some standards, failed to provide adequate disease control.

Table 12. 1998-99 Snow Mold Disease Data

Location: Boyne Highlands Resort, Harbor Springs, MI  
 Rating date: 1 April, 1999  
 Rating scale: percent plot area infected with *T. incarnata*

<u>Treatment and rate/1000 sq ft</u>	<u>Mean (LSD)</u>
Heritage 0.4 oz + Daconil Weather Stik 5.5 fl oz + Turfcide 400 12 fl oz	0.0 g
Ch 26GT 8 fl oz + Daconil Weather Stik 5.5 fl oz + Turfcide 400 12 fl oz	0.0 g
Ch 26GT 4 fl oz + Daconil Ultrex 4 oz + Turfcide 400 6 fl oz	0.0 g
Heritage 0.4 oz + Daconil Weather Stik 5.5 fl oz	0.3 fg
Heritage 0.4 oz + Daconil Weather Stik 2.25 fl oz + Turfcide 400 6 fl oz	0.3 fg
Heritage 0.4 oz + Daconil Weather Stik 2.25 fl oz + Turfcide 400 6 fl oz <sup>f</sup>	0.3 fg
Thalonil 4L 6.4 fl oz + Ch 26GT 4 fl oz + Turfcide 400 6 fl oz	0.7 fg
Turfcide 400 12 fl oz	1.7 fg
Heritage 0.4 oz + Turfcide 400 12 fl oz	1.7 fg
Fore 80W 8 oz + PCNB 8 oz	2.7 fg
Ch 26GT 4 fl oz + Turfcide 400 8 fl oz <sup>c</sup>	3.0 fg
Scotts FFII 103.8 oz	4.3 fg
Parflo 4F 8 fl oz + Banner Maxx 2 fl oz	5.0 fg
Daconil Weather Stik 5.5 fl oz	6.3 fg
Heritage 0.4 oz	6.3 fg
Compass 50 WG 0.3 oz + Banner Maxx 3 fl oz <sup>b</sup>	7.7 fg
Amvac PCNB 10G 5 lbs	8.3 fg
Ch 26GT 4 fl oz + Turfcide 400 8 fl oz + Signature 4 oz <sup>c</sup>	10.7 fg
Parflo 4F 12 fl oz	12.3 g
CGA BMP (47.3WP) 1 oz + Banner Maxx 1.5 fl oz <sup>b</sup>	12.7 fg
Spectro 6 oz <sup>a</sup> + Defend 75WP 8 oz	13.0 fg
Spectro 10 oz <sup>a</sup> + Defend 75WP 8 oz	13.3 fg
Spectro 4 oz <sup>a</sup> + Defend 75WP 8 oz	13.3 fg
AMV88-2 5 lbs	13.3 fg
Spectro 8 oz <sup>a</sup> + Defend 75WP 8 oz	15.0 fg
Penstar 15G 106.7 oz	15.0 fg
Compass 50 WG 0.15 oz + Banner Maxx 3 fl oz <sup>b</sup>	16.7 e-g
Fore 80W 8 oz + PCNB 6 oz	16.7 e-g
PCNB 10 Granular 120 oz	16.7 e-g
PCNB 20WDG 2.5 lbs	16.7 e-g
Compass 50 WG 0.3 oz + Banner Maxx 2 fl oz <sup>b</sup>	17.3 e-g
Turfcide 10G 160 oz	18.3 d-g
ANDFG 209-98 6.66 lb <sup>e</sup>	19.3 d-g
Turfcide 10G 120 oz	21.7 c-g
Penstar 15G 53.3 oz	23.3 b-g
Penstar 15G 80 oz	24.0 b-f
QST 713 10 #/A	40.0 a-e
Control	41.7 a-d
QST 713 20 #/A	43.3 a-c
Fore 80W 8 oz	43.3 a-c
ANDFG 209-98 6.66 lb <sup>d</sup>	43.3 a-c
Junction 4 oz	43.3 a-c
Compass 50 WG 0.3 oz <sup>b</sup>	45.0 a-c

**Treatment and rate/1000 sq ft**

QST 713 5#/A

Junction 8 oz

<sup>a</sup> Treatments applied on 2 Oct.<sup>b</sup> Treatments applied at 3 gal/1000 sq ft spray rate<sup>c</sup> First application made 2 Oct and second made 30 Oct.<sup>d</sup> Treatment applied to dry turf<sup>e</sup> Treatment applied to wet turf<sup>f</sup> Applied with Lesco non-ionic surfactant (0.25% v/v)<sup>g</sup> Plot also infected with pink snow mold (*Microdochium nivale*)**Mean**

46.7 ab

51.7 a

Table 13. 1998-99 Snow Mold Disease Data

Location: Treetops/Sylvan Resort, Gaylord, MI

Rating date: 31 March, 1999

Rating scale: percent plot area infected with *T. ishikariensis***Treatment and rate/1000 sq ft**

Heritage 0.4 oz + Daconil Weather Stik 5.5 fl oz + Turfcide 400 12 fl oz

Ch 26GT 8 fl oz + Daconil Weather Stik 5.5 fl oz + Turfcide 400 12 fl oz

Ch 26GT 4 fl oz + Daconil Ultrex 4 oz + Turfcide 400 6 fl oz

Thalonil 4L 6.4 fl oz + Ch 26GT 4 fl oz + Turfcide 400 6 fl oz

Compass 50 WG 0.3 oz + Banner Maxx 3 fl oz<sup>b</sup>

Heritage 0.4 oz + Daconil Weather Stik 5.5 fl oz

Scotts FFII 103.8 oz

Heritage 0.4 oz + Daconil Weather Stik 2.25 fl oz + Turfcide 400 6 fl oz<sup>f</sup>

Heritage 0.4 oz + Daconil Weather Stik 2.25 fl oz + Turfcide 400 6 fl oz

Spectro 10 oz<sup>a</sup> + Defend 75WP 8 oz

Heritage 0.4 oz + Turfcide 400 12 fl oz

Fore 80W 8 oz + PCNB 6 oz

Fore 80W 8 oz + PCNB 8 oz

Compass 50 WG 0.3 oz + Banner Maxx 2 fl oz<sup>b</sup>CGA BMP (47.3WP) 1 oz + Banner Maxx 1.5 fl oz<sup>b</sup>Compass 50 WG 0.15 oz + Banner Maxx 3 fl oz<sup>b</sup>

Parflo 4F 8 fl oz + Banner Maxx 2 fl oz

Daconil Weather Stik 5.5 fl oz

ANDFG 209-98 6.66 lb<sup>d</sup>

Parflo 4F 12 fl oz

Turfcide 10G 160 oz

Penstar 15G 53.3 oz

Penstar 15G 106.7 oz

Heritage 0.4 oz

Ch 26GT 4 fl oz + Turfcide 400 8 fl oz + Signature 4 oz<sup>c</sup>

Turfcide 400 12 fl oz

Compass 50 WG 0.3 oz<sup>b</sup>

Turfcide 10G 120 oz

AMV88-2 5 lbs

QST 713 5#/A

PCNB 10 Granular 120 oz

ANDFG 209-98 6.66 lb<sup>e</sup>**Mean**

0.3

0.3

2.7

7.0

14.7

15.0

16.7

17.3

18.0

18.3

20.7

23.3

24.0

27.7

30.0

34.0

35.0

36.7

50.0

51.7

55.0

63.3

63.3

65.0

65.3

66.7

67.7

68.3

70.0

73.3

75.0

75.0

**LSD**

m

m

m

lm

lm

lm

lm

lm

lm

k-m

k-m

j-m

j-m

j-m

il

h-l

g-l

f-k

e-k

d-j

c-l

c-i

b-l

b-h

a-g

a-g

a-f

a-f

a-f

a-f

a-f

a-f

<u>Treatment and rate/1000 sq ft</u>	<u>Mean</u>	<u>LSD</u>
Junction 8 oz	75.0	a-f
Amvac PCNB 10G 5 lbs	75.0	a-f
Penstar 15G 80 oz	80.0	a-f
PCNB 20WDG 2.5 lbs	81.7	a-e
Ch 26GT 4 fl oz + Turfcide 400 8 fl oz <sup>c</sup>	83.3	a-d
Control	85.3	a-d
QST 713 10 #/A	93.7	a-c
Fore 80W 8 oz	95.0	ab
Junction 4 oz	96.0	ab
QST 713 20 #/A	97.0	a

<sup>a</sup> Treatments applied on 2 Oct.

<sup>b</sup> Treatments applied at 3 gal/1000 sq ft spray rate

<sup>c</sup> First application made 2 Oct and second made 30 Oct.

<sup>d</sup> Treatment applied to dry turf

<sup>e</sup> Treatment applied to wet turf

<sup>f</sup> Applied with Lesco non-ionic surfactant (0.25% v/v)

<sup>g</sup> Plot also infected with pink snow mold (*Microdochium nivale*)