

7th Annual Microdochium Patch Field Day

March 3, 2022 – 3 P.M.

Oregon State University Lewis-Brown Horticulture Farm, 33329 Peoria Rd, Corvallis, OR, 97331

Alec Kowalewski, Brian McDonald, Clint Mattox, Emily Braithwaite, Wrennie Wang, Chas Schmid, Cole Stover
and Zach Hamilton

Department of Horticulture

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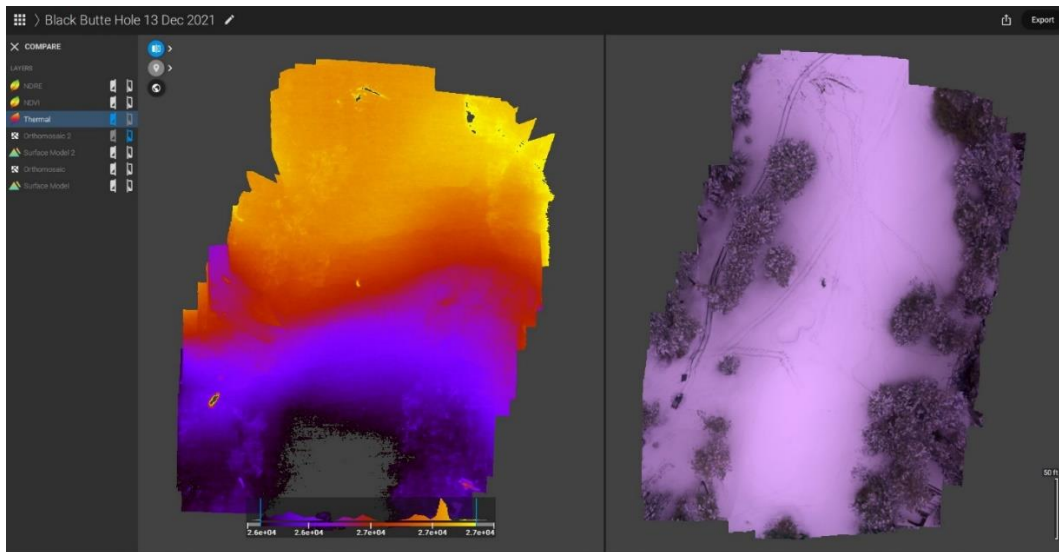
5:00 - PM BBQ at Trysting Tree Golf Club

Developing an Environmental Model for Predicting Winter Kill in Central Oregon

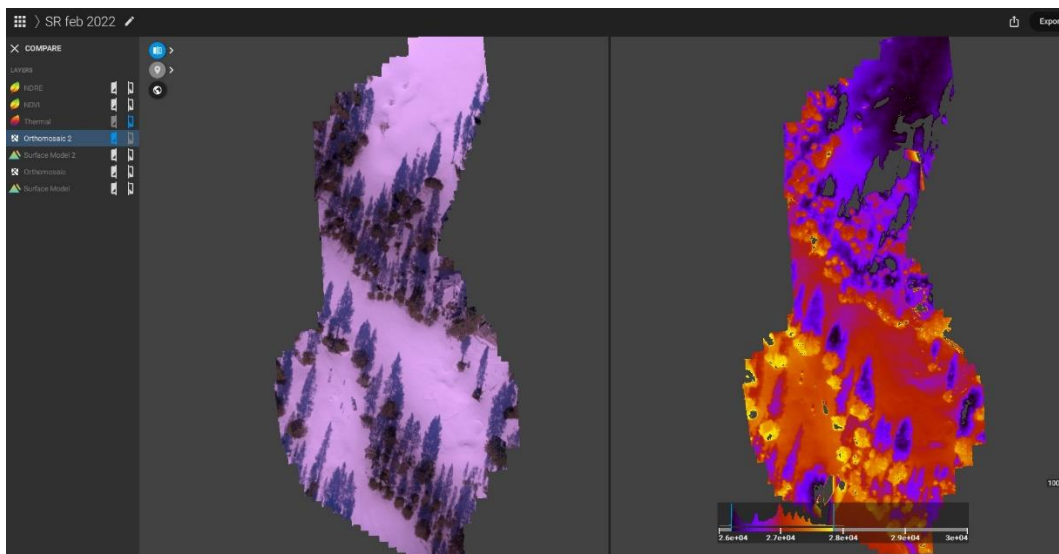
Cole Stover and Alec Kowalewski

Objective: To develop an environmental model to predict winter kill by correlating local environmental conditions to turf damage using drone digital imaging technology.

Monthly digital images and surface temperature data will be collected using an unmanned aerial vehicle. Additionally, daily local weather station data will be used to build the model. When snow is not present, turfgrass quality will be visually assessed. Sites include Big Meadows Golf Course at Black Butte Ranch, Broken Top Golf Club, Widgi Creek Golf Club, and The Woodlands Course at Sunriver Resort.



Thermal image (left) compared to digital image (right) at Black Butte Ranch, Sisters, OR. Fairway, approach and putting green (top to bottom of the image). Significant winter kill has been observed on the green in the past.



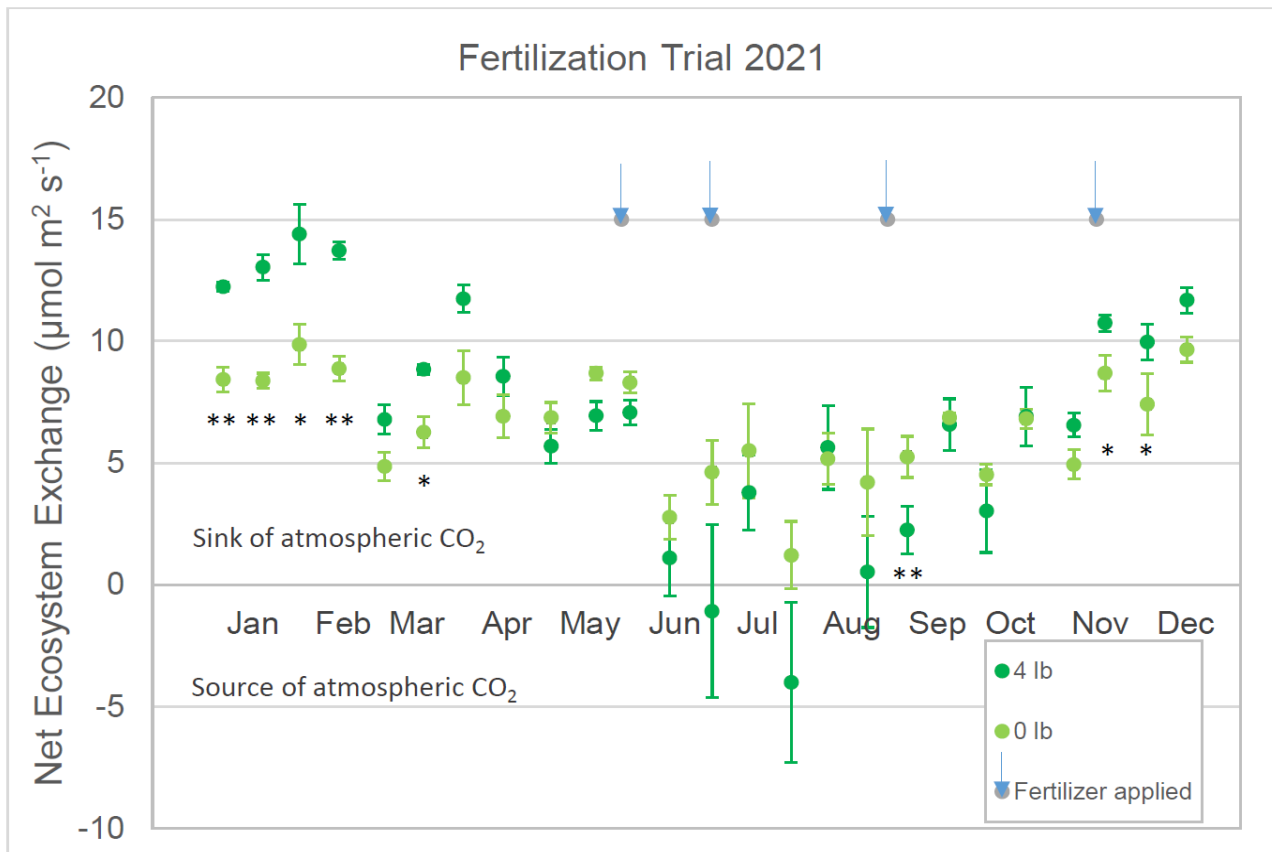
Digital image (left) and thermal image at Sunriver Resort, Sunriver, OR (right). Green 6 top, green 7 middle, and tee 8 bottom. Green 7 has historically had winter kill damage in the past.

Fertilization Affects the Ability of Cool-Season Turfgrass System to Assimilate Carbon Dioxide

Ruyang Wang¹, Clint Mattox¹, Emily Braithwaite¹, Claire Phillips², Tim Stock¹, and Alec Kowalewski¹

¹Horticulture, Oregon State University, Corvallis, OR; ²USDA-ARS

- 0 vs 196 kg N ha⁻¹ (0 vs 4 lbs annually) on cool-season lawn without pesticide.
- Net ecosystem CO₂ exchange (NEE) = photosynthesis - ecosystem respiration
- Ecosystem respiration: respiration from grass and soil respiration (microbes, insects etc.)



Fertilization effects on NEE. Error bars indicate standard deviation; *, ** denote significance at $p < 0.05$ and 0.01, respectively. Negative NEE means CO₂ emission.

Summary

- Turfgrass ecosystem varied in NEE by season, high in the cool months, low in the summer months.
- Summer months: high variation in the data, no benefit from fertilization.
- Fertilization increased NEE during cool months.

Quantifying the long-term effects of alternative Microdochium patch management on a sand-based annual bluegrass putting green

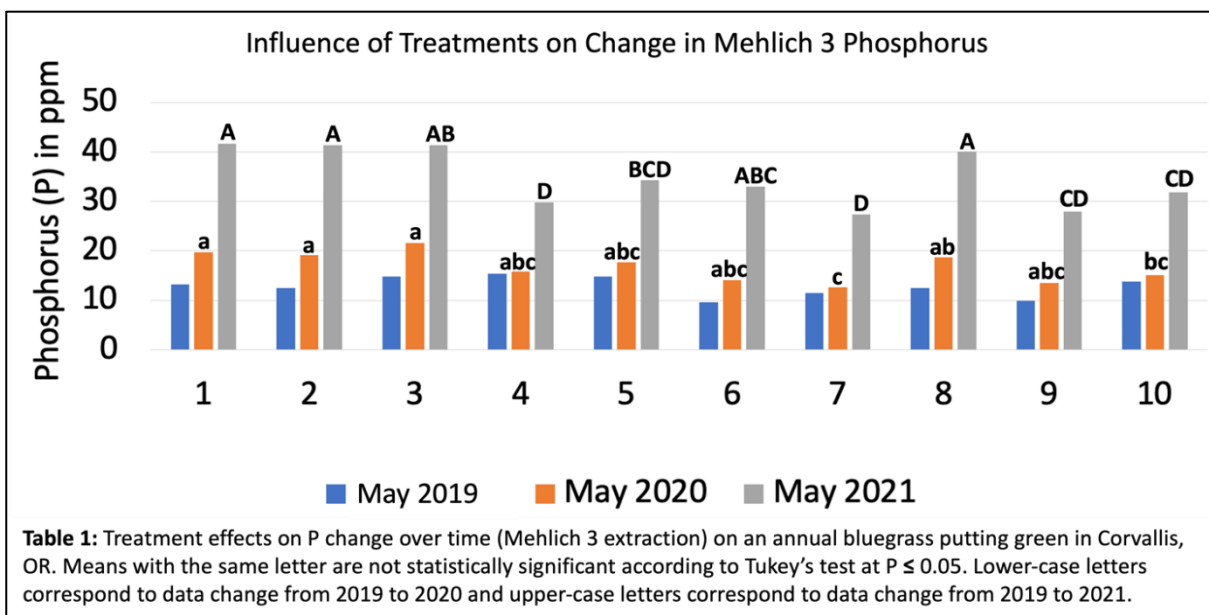
Clint Mattox, Brian McDonald, Emily Braithwaite, and Alec Kowalewski

Treatment Number	Product	Rate / M
1	Elemental S Duraphite 12	0.25 lbs. 3.2 fl.oz.
2a (Sep,Oct,Nov,Apr)	Civitas One Duraphite 12	8.5 fl.oz. 3.2 fl.oz.
2b Dec - Mar	Elemental S Duraphite 12	0.25 lbs. 3.2 fl.oz.
3a 4-wk rotation)	Civitas One Duraphite 12	8.5 fl.oz. 3.2 fl.oz.
3b (4-wk rotation)	Elemental S Duraphite 12	0.25 lbs. 3.2 fl.oz.
4a	Civitas One	8.5 fl.oz.
4b (4-wk rotation)	Elemental S Duraphite 12	0.25 lbs. 3.2 fl.oz.
5	0.50 # FeSO ₄ Duraphite 12	0.5 lbs. 3.2 fl.oz.
6	1.0 # FeSO ₄ Duraphite 12	1.0 lbs. 3.2 fl.oz.
7	Elemental S	0.25 lbs.
8	Duraphite 12	3.2 fl.oz.
9	Fungicide Contol	
10	Control	

The objective of this experiment is to observe the long-term impacts of winter applications of alternative to traditional fungicides on Microdochium patch suppression, summer putting green performance, and soil fertility on an annual bluegrass putting green. The trial began in September 2018 and all treatments have consistently suppressed Microdochium patch compared to the control treatment, although concerns still exist regarding the influence of treatments on summer anthracnose and turfgrass quality. There is evidence that phosphorous acid applications lead to an increase in available soil phosphorus (P) over time (Table 1).

East-- >>

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



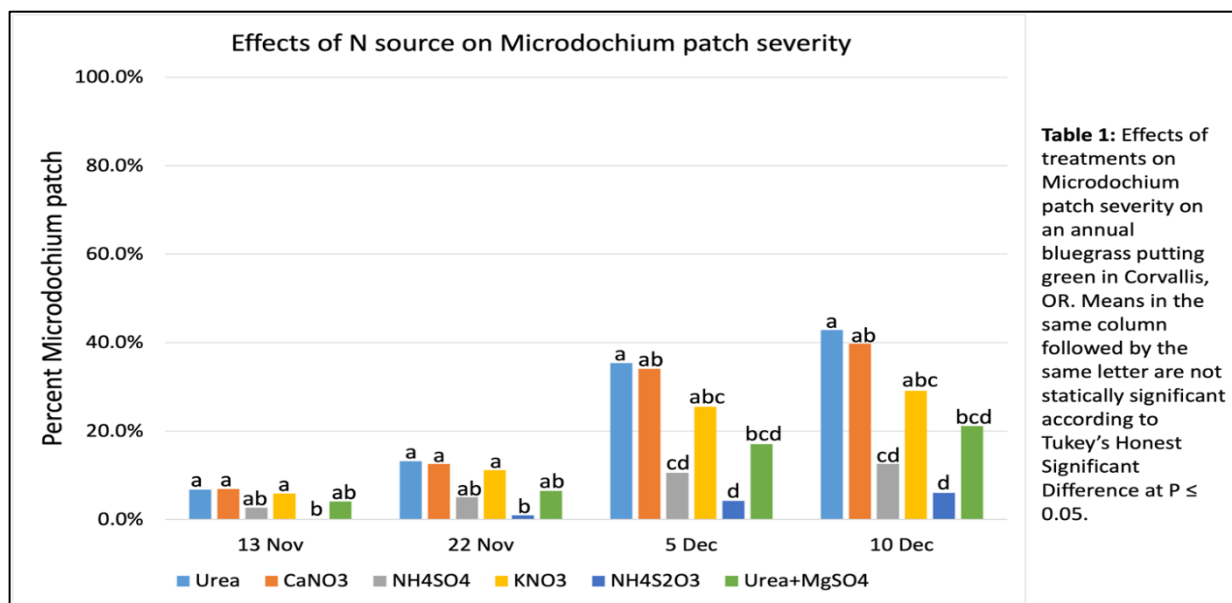
Effects of Nitrogen Sources on Microdochium patch severity

Clint Mattox, Brian McDonald, Emily Braithwaite, and Alec Kowalewski

The objective of this experiment is to compare different nitrogen sources on the severity of Microdochium patch. The first year of the experiment began on 16 September 2021 and is ongoing. Analysis of the percent Microdochium patch data strongly suggest that ammonium sulfate and

ammonium thiosulfate suppress Microdochium patch compared to when urea or calcium nitrate are used as nitrogen sources (Table 1). It should be noted that ammonium thiosulfate has resulted in leaf tip burn on a few rating dates. These data also suggest that adding magnesium sulfate to urea applications leads to less Microdochium patch compared to applying only urea. These results are encouraging and highlight potential benefits of applying sulfate in the winter to suppress Microdochium patch.

East --- >							
Treatment Number	Product	N rate applied monthly starting 16 Sep 2021					
1	Urea	0.1#N/M	1	10	9	4	8
2	Urea	0.2#N/M	3	11	7	6	5
3	CaNO ₃	0.1#N/M	12	2		8	6
4	CaNO ₃	0.2#N/M	4	9	7	2	3
5	NH ₄ SO ₄	0.1#N/M	1	11	12	5	10
6	NH ₄ SO ₄	0.2#N/M	11	3	1	8	6
7	KNO ₃	0.1#N/M	7	2	10	12	5
8	KNO ₃	0.2#N/M	4	9		1	9
9	NH ₄ S ₂ O ₃	0.1#N/M	11	5	7	4	10
10	NH ₄ S ₂ O ₃	0.2#N/M	6	12	8	2	3
11	Urea MgSO ₄	0.1#N/M SO ₄ = NH ₄ SO ₄					
12	Urea MgSO ₄	0.2#N/M SO ₄ = NH ₄ SO ₄					



2021 Simplot Fall Microdochium Patch Trial
Emily Braithwaite

Oregon State University

Initiated: 9/30/21

Location: North Poa Green, east side

South ----->

	Rep 4	Rep 3	Rep 2	Rep 1
4'	3	2	9	6
	9	7	8	1
	2	4	7	5
	8	1	6	3
	4	3	5	7
	5	6	4	2
	7	9	3	8
	1	8	2	9
	6	5	1	4

Trts	Product	Rate/M
1 Non-treated		-
2 Duraphite 12 + Extreme Green 20 + Ambient Plus		6.0 + 6.0 + 0.37
3 Duraphite 12 + Iron Chelate + Ambient Plus		6.0 + 6.0 + 0.37
4 Duraphite 12 + Extreme Green 20 + Ambient Plus		3.2 + 3.0 + 0.37
5 Spray-007 + Duraphite 12 + Extreme Green 20 + Ambient Plus		0.125% v/v + 3.2 + 3.0 + 0.37
6 Ambient Plus		0.37
7 EXP220GB		0.37
8 Duraphite 12 + Extreme Green 20 + EXP220GB		3.2 + 3.0 + 0.37
9 Banner Maxx (2 apps) then Duraphite 12 + Extreme Green 20 + Ambient Plus		2.0 then 3.2 + 3.0 + 0.28

Reducing Microdochium Patch Pressure with Fertilizer Products

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Brian McDonald

Background: This trial is funded by E. Marker A/S (Denmark). Product claims include increased turf quality, reduced stress, reduced Microdochium patch and being environmentally safe.

Product 1: TourTurf High PK (0-18-12) contains phosphorous acid (unspecified amount), seaweed extract, humic acids, and cedarwood oil.

Declaration	EU	DK
Liquid Fertilizer NPK	0-18-12	0-8-10
Analysis (w/w):		
Phosphorus Pentoxide (P_2O_5)	18,0 %	
Phosphorus (P)		7,9 %
Potassium Oxide (K_2O)	12,0 %	
Potassium (K)		10,0 %

Product 2: TourTurf FDC Autumn + R Factor is a fertilizer with nitrogen (5%), iron (5%), sulfur (7.2%), amino acids, zinc, and manganese. It also contains citronella, tea tree, and clove oils, chitosan, acticide mbl (a microbicide and fungicide used in cosmetics and paints) and a wetting agent.

Declaration	EU	DK
Analysis (w/w):		
Nitrogen (N)	5,0 %	5,0 %
Total Iron (Fe)	5,0 %	5,0 %
Ferrous Sulphate	4,5 %	4,5 %
EDTA chelated Iron	0,5 %	0,5 %
Sulphur (S)		2,86 %
Sulphur (SO_4)	7,16 %	
Zinc (Zn)	0,1 %	0,1 %
Manganese (Mn)	0,1 %	0,1 %
Amino acids (Glycin)	0,5 %	0,5 %

Also contains citronella, tea tree and clove essential oils. Acticide mbl, Chitosan and wetting agent.



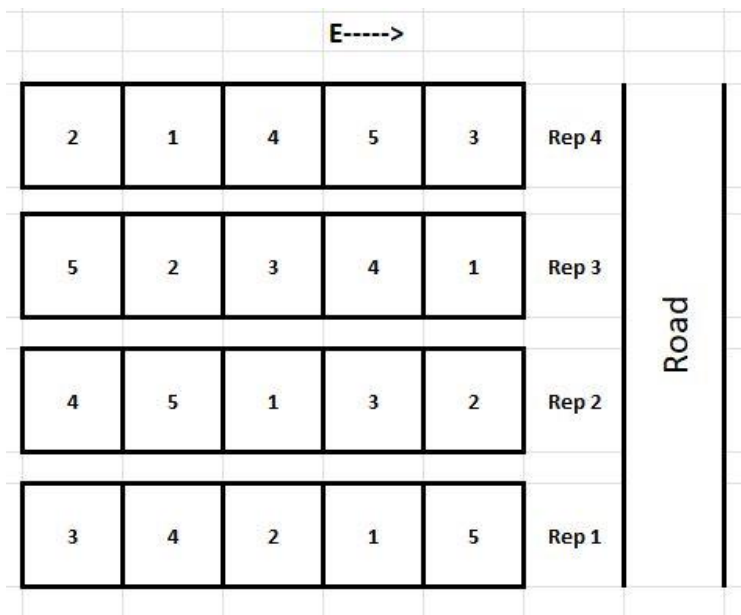
Reducing Microdochium Patch Pressure with Fertilizer Products

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Applications to Date: 12/7, 1/7, 2/3 (3 apps at 28 day interval)

Results To Date:

Trt #	Treatments	Rate fl. oz./M	Interval	Number of Infection Centers			02/24 Percent Disease
				12/16	02/24	grps	
1	Untreated	na	na	0.0	140.8	a	9.4
2	Standard Fungicide Rotation	varies	28 days	0.0	0.0	c	0.0
3	TourTurf FDC (with 5% iron)	12.6	28 days	0.0	66.3	bc	3.2
4	TourTurf High PK ¹ (with phosphite)	3.1	28 days	0.0	114.3	ab	6.9
5	TourTurf FDC + TourTurf High PK	12.6 + 3.1	28 days	0.0	35.0	c	1.3
			LSD @ .05	nv	72.2		ns



Fungicide Rotation:

12/7 - 26 GT + Turfcide 400 (4.0 + 6.0)

1/7 - Affirm + Daconil W/S (0.9 + 5.5)

2/3 – Densicor + Secure (0.20 + 0.5)

Note: fungicides were applied to the entire trial area before the trial was started.

Comparison of Traditional Fungicides Applied Every 28 days vs. a Phosphite Fungicide Applied Every 14 Days for the Curative Suppression of Microdochium Patch

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Brian McDonald

Background: This trial was funded by Syngenta, Harrell's, and E. Marker A/S. Syngenta is evaluating new fungicides. Harrell's is evaluating their phosphite fungicide (Title Phyte) at various rates and in combination with other products. E. Marker A/S is evaluating one product (TourfTurf STA Sports Turf Acidifier (5-0-0)). These are all "normal" product evaluation treatments. However, the results to-date demonstrate a potential difference in effectiveness in suppressing active disease between phosphite fungicides and some traditional fungicides.

Applications to Date:

Syngenta Fungicides: 1/12 & 2/9

Harrell's Title Phyte Combinations: 1/12, 1/26, 2/9, 2/24.

E. Marker A/S' TourTurf STA: 1/12, 1/26, 2/9, 2/24.

Trt #	Treatment	Rate(oz.)/M	Interval
1	Untreated	na	na
2	Title Phyte Fungicide*	2.0	14 days
3	Title Phyte	4.0	14 days
4	Title Phyte + Activator SA	4.0 + .32	14 days
5	Title Phyte + Iron Plus	4.0 + 3.67	14 days
6	Title Phyte + Amino Iron	4.0 + .735	14 days
7	Posterity XT**	3.0	28 days
8	Contend A + Contend B	1.0 + 2.6	28 days
9	Contend B	2.6	28 days
10	A23543A	1.5	28 days
11	TourTurf STA (5-0-0) ***	6.3	14 Days
12	Duraphite 12	9.6	28 Days

*Title Phyte contains 4.71 lbs. of phosphorous acid per gallon. A 4.0 fl. oz. rate/1,000 sq. ft. is 94% higher than a 3.2 fl. oz. rate of Duraphite 12, which is the rate that Dr. Mattox used in his research.

** Posterity XT is Pydiflumetofen, Azoxystrobin, and propiconazole

*** TourTurf STA (Sports Turf Acidifier) contains 4% iron and 8.6% sulfur.

Comparison of Traditional Fungicides Applied Every 28 days vs. a Phosphite Fungicide Applied Every 14 Days for the Curative Suppression of Microdochium Patch

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Results to Date:

				Infection Centers		Percent Disease				
Trt #	Treatment	Rate(oz.)/M	Interval	01/12 (0 DAT)		01/12 (0 DAT)	01/25	2/10	2/24	LSD Grps
1	Untreated	na	na	15.8		0.11	1.48	4.6	8.25	A
2	Title Phyte	2.0	14 days	15.0		0.10	0.81	3.4	4.81	AB
3	Title Phyte	4.0	14 days	15.0		0.09	0.70	2.3	3.13	BC
4	Title Phyte + Activator SA	4.0 + 0.32	14 days	13.0		0.10	0.59	1.8	2.38	BC
5	Title Phyte + Iron Plus	4.0 + 3.67	14 days	14.3		0.11	1.01	3.0	4.88	AB
6	Title Phyte + Amino Iron	4.0 + .735	14 days	14.3		0.10	0.77	2.9	4.88	AB
7	Posterity XT	3.0	28 days	17.0		0.10	0.20	0.2	0.15	C
8	Contend A + Contend B	1.0 + 2.6	28 days	15.8		0.09	0.14	0.2	0.12	C
9	Contend B	2.6	28 days	14.0		0.09	0.14	0.3	0.28	C
10	A23543A	1.5	28 days	14.8		0.11	0.07	0.1	0.09	C
11	TourTurf STA	6.3	14 Days	16.8		0.12	0.85	2.5	3.50	BC
12	Duraphite 12	9.6	28 days	18.0		0.12	0.60	2.0	2.11	BC
				ns		ns	0.759	2.88	4.21	

Selectively Removing Tall Fescue from Fine Fescue with Manuscript (Pinoxaden) Herbicide

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Brian McDonald

Background:

Manuscript is a grass herbicide that is labeled for warm season grasses. Syngenta is working to expand the label for use on cool season grasses in specific circumstances. It is much safer on annual bluegrass than Fusillade II or Segment and is more effective at removing perennial ryegrass (for example from annual bluegrass collars). In this trial, we look at removing tall fescue from a stand of fine fescue. Note: Manuscript does injure bentgrass.

Application Dates: 10/19/21 & 11/14/21 (26-day interval)

Results:

			1/25/2022	
		Product	Percent	LSD
Trt #	Treatment	Rate/Acre	Tall Fescue Control	Grps
1	Untreated	na	0.0	D
2	Fusillade II + Adigor*	16.0	73.2	C
3	Manuscript + Adigor	19.2	89.2	B
4	Manuscript + Adigor	38.4	94.7	AB
5	Manuscript + Adigor	57.6	98.6	A
* Adigor applied at 0.50% v/v				

Conclusions:

- With 1 year of data, Manuscript, at all rates, appears to be more effective at controlling tall fescue than Fusillade II applied at 16.0 fl. oz. per acre.
- With 2 years of safety trials, we have not seen any injury to fine fescue.
- We do not know how the timing (fall applications) affected the results.

Technical Information: ACCase Inhibitors include herbicides belonging to Aryloxyphenoxypropionate (FOPs), cyclohexanedione (DIMs), and phenylpyrazolin (DENs) chemistries. These herbicides inhibit the enzyme acetyl-CoA carboxylase (ACCase), which catalyzes the first step in fatty acid synthesis and is important for membrane synthesis. In general, broadleaf species are naturally resistant to FOPs, DIMs, and DENs herbicides because of a less sensitive ACCase enzyme. However, ACCase inhibiting herbicides may cause symptoms on certain broadleaf crops. Natural tolerance of some grasses is due to a less sensitive ACCase enzyme or a higher rate of metabolic degradation. (taken from University of California Division of Agriculture and Natural Resources (https://herbicidesymptoms.ipm.ucanr.edu/MOA/ACCase_inhibitors))

Selectively Removing Tall Fescue from Fine Fescue with Manuscript (Pinoxaden) Herbicide Continued...

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Initiated: 10/19/21; second app, 11/14/21

E-->

Road

2	3	1	5		4		
4	1		2	3		5	
5	1			4	3		2

Trt #	Treatment	Rate fl. oz. Per Acre	Rate Surfactant	# of Apps	Interval
1	Untreated	na	na	na	na
2	Fusillade II + Adigor*	16.0	0.50% v/v	2	21 days
3	Manuscript + Adigor	19.2	0.50% v/v	2	21 days
4	Manuscript + Adigor	38.4	0.50% v/v	2	21 days
5	Manuscript + Adigor	57.6	0.50% v/v	2	21 days

Optimal Mowing Height and Nitrogen Fertilization for Improving Tall Fescue Turf Quality in Winter

Clint Mattox, Brian McDonald, and Alec Kowalewski

West -- >>				Trt #	Months Applied	N/app	Total lbs. of N per year
Rep 4	Rep 3	Rep 2	Rep 1				
11	2	8	1	1	May, Jul, Sep, Nov, & Dec	0.4 lb.	2
5	7	12	9	2	May, Jul, Sep, Oct, & Nov	0.4 lb.	2
10	8	11	6	3	May, Sep, Oct, Nov, & Dec	0.4 lb.	2
4	9	3	10	4	Apr, May, July, Aug, & Sep	0.4 lb.	2
12	1	5	7	5	May, Jul, Sep, Nov, & Dec	0.8 lb.	4
7	6	9	3	6	May, Jul, Sep, Oct, & Nov	0.8 lb.	4
1	12	4	11	7	May, Sep, Oct, Nov, & Dec	0.8 lb.	4
8	3	7	2	8	Apr, May, July, Aug, & Sep	0.8 lb.	4
9	10	1	8	9	May, Jul, Sep, Nov, & Dec	1.2 lb.	6
2	5	6	4	10	May, Jul, Sep, Oct, & Nov	1.2 lb.	6
3	11	2	12	11	May, Sep, Oct, Nov, & Dec	1.2 lb.	6
6	4	10	5	12	Apr, May, July, Aug, & Sep	1.2 lb.	6

This study is designed to evaluate mowing heights and nitrogen regimes on tall fescue, quantifying monthly turfgrass performance with a particular focus on winter turfgrass quality. Mowing and nitrogen fertilization are primary management practices that can be easily adopted by any turf managers and lawn owners. Preliminary results suggest that higher mowing heights, fertilizer applied after September, and higher rates of nitrogen improve tall fescue color as measured using the average annual normalized difference vegetative index (NDVI) (Table 1). In January 2022, the increase in NDVI was especially evident on treatments receiving higher rates of nitrogen and applications after September (Figure 1).

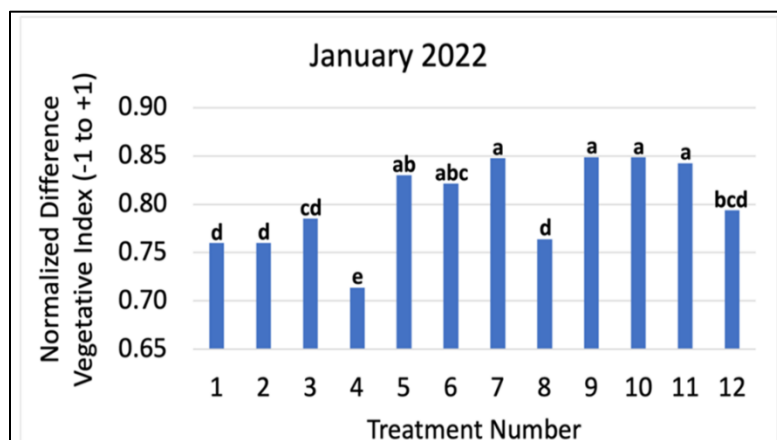


Figure 1: Bar graph representing normalized vegetative index (NDVI) on 21 January 2022 on tall fescue in Corvallis, OR. Bars sharing the same letter are not significantly different according to Tukey's HSD test at $\alpha \leq 0.05$.

Mowing Height	Annual NDVI
Two Inches	0.87 b
Three Inches	0.89 a

Timing	Annual NDVI
May, Jul, Sep, Nov, & Dec	0.88 b
May, Jul, Sep, Oct, & Nov	0.89 ab
May, Sep, Oct, Nov, & Dec	0.89 a
Apr, May, Jul, Aug, & Sep	0.87 c

Annual Nitrogen Rate	Annual NDVI
2 # N / M / YR	0.87 c
4 # N / M / YR	0.88 b
6 # N / M / YR	0.89 a

Table 1: Letter diagram of the effects of treatments on normalized difference vegetative index (NDVI) averaged over 12 months on tall fescue. Means following by the same letter are not significantly different according to Tukey's HSD test at $\alpha \leq 0.05$.

2021 Fall Microdochium Patch Trial: AMVAC, Bayer, Control Solutions, FMC, PBI Gordon and Syngenta

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Emily Braithwaite

Oregon State University

Initiated: 10/11/21

Location: Larsen Green, east side

South ----->

4'	X	13	12	2	25	11	15	3	4	1	22	Rep 4
	8	16	17	6	21	26	18	5	27	9	23	
	7	10	14	19	20	24	12	13	25	20	2	
	24	5	23	3	15	6	21	17	8	1	22	Rep 3
4'	16	26	14	10	27	7	19	4	9	11	18	
	17	18	19	20	21	22	23	24	25	26	27	
	16	15	14	13	12	11	10	9	8	7	x	Rep 2
	3	24	8	6	7	1	2	3	4	5	6	
4'	5	2	18	14	22	17	25	16	26	11	19	
	10	13	20	1	27	23	9	4	15	12	21	Rep 1

2021 Fall Microdochium Patch Trial: AMVAC, Bayer, Control Solutions, FMC, PBI Gordon and Syngenta (Page 2 of 2)

Trt#	Treatments	Rate (oz.)/M	Interval	Avg. % Dis. 2/28/22
1	Non-treated	na	na	49.0
2	Turfcide 400	8.0	28 day	0.0
3	Premion	6.0	28 day	0.0
4	Turfcide 400 + Chipco 26GT	4.0 + 4.0	28 day	0.0
5	Turfcide 400 + 3336	4.0 + 2.0	28 day	0.2
6	Turfcide 400 + Instrata	4.0 + 4.0	28 day	0.0
7	Interface Stressgard	6.0	21 day	0.0
8	Interface Stressgard	4.0	21 day	0.0
9	Densicor	0.196	21 day	0.5
10	Interface Stressgard rotated with Densicor	6.0 / 0.196	21 day	0.1
11	Interface Stressgard rotated with Densicor	4.0 / 0.196	21 day	0.1
12	ESTC 124	5.0	21 day	10.8
13	Densicor + ESTC 124	0.196 + 5.0	21 day	0.1
14	Signature Xtra Stressgard	4.0	21 day	3.2
15	Signature Xtra Stressgard rotated with Densicor	4.0 / 0.196	21 day	3.2
16	ESTC 191	0.5	21 day	0.1
17	ESTC 191 rotated with Densicor	0.5 / 0.196	21 day	0.2
18	Control Solutions Rotation:		28 day	0.0
	a. Strobe Pro + Foursome Plus	3.0 + 0.4		
	b. Intaglio + Foursome Plus	7.2 + 0.4		
	c. Enclave + Foursome Plus	8.0 + 0.4		
19	Rayora + Fame +C	1.4 + 5.9	28 day	1.4
20	Rayora + Fame SC	1.4 + 0.36	28 day	25.8
21	NB40482	2.00	14 day	15.8
22	NB40482	4.00	21 day	15.0
23	NB40482	4.00	21 day; 1/4" irr.	21.3
24	NB40482 / Secure Action	4.0 / 0.5	21 day: 1/4" irr. / 28 day	1.7
25	NB40482 / Secure Action	4.0 / 0.5	21 day / 28 day	0.3
26	Secure Action	0.50	28 day	3.6
27	Daconil Action	3.50	28 day	6.6