Thursday – 28th of February, 2019

4TH ANNUAL
MICRODOCHIUM PATCH FIELD DAY

Lewis Brown Horticulture Farm
Corvallis, OR
33329 Peoria Rd.
Corvallis, OR 97333

Speakers:

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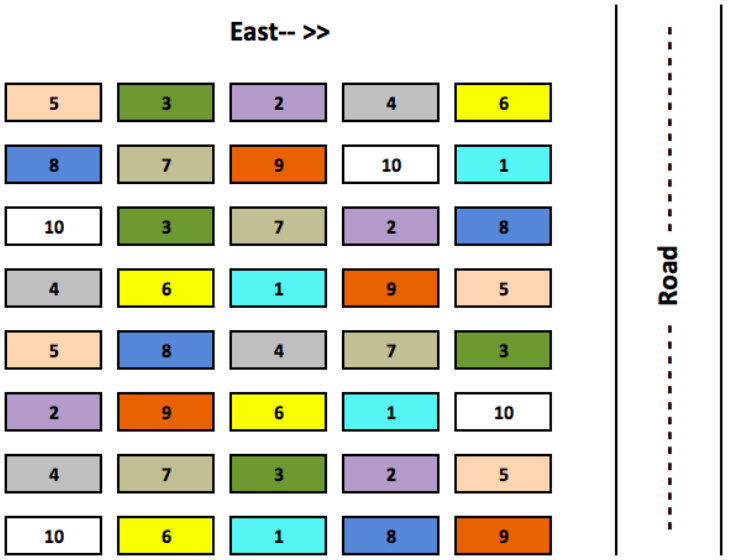
Quantifying the long-term effects of alternative Microdochium patch management techniques on sand-based annual bluegrass putting green performance over multiple seasons.

Presenter: Clint Mattox

In addition to quantifying Microdochium patch suppression and winter turfgrass quality, this experiment aims to provide information about the long-term impacts that repeated phosphorous acid, mineral oil, sulfur, and/or iron sulfate has on soil fertility, summer anthracnose, and summer putting green performance with or without the use of growth regulators and DMI fungicides. Data collection will include annual soil fertility levels, summer putting green speed, summer water infiltration, summer volumetric water content %, summer NDVI, monthly disease incidence (primarily Microdochium patch and anthracnose), and monthly turfgrass quality. A beneficial outcome of this research will be to provide answers to golf course superintendents regarding the long-term use of alternative techniques to manage Microdochium patch on annual bluegrass putting greens.

Trt # 1	Elemental Sulfur Duraphite 12	0.25 #/M 3.2 oz./M
Trt # 2a (Sep, Oct, Nov, Apr)	Civitas One Duraphite 12	8.5 oz./M 3.2 oz./M
Trt # 2b (Dec, Jan, Feb, Mar)	Elemental Sulfur Duraphite 12	0.25 #/M 3.2 oz./M
Trt # 3a	Civitas One Duraphite 12	8.5 oz./M 3.2 oz./M
Trt # 3b (in 4-wk rotation)	Elemental Sulfur Duraphite 12	0.25 #/M 3.2 oz./M
Trt # 4a	Civitas One	8.5 oz./M
Trt # 4b (in 4-wk rotation)	Elemental Sulfur Duraphite 12	0.25 #/M 3.2 oz./M
Trt # 5	0.50 # FeSO4/M Duraphite 12	0.5 #/M 3.2 oz./M
Trt # 6	1.0 # FeSO4/M Duraphite 12	1.0 #/M 3.2 oz./M
Trt # 7	Elemental Sulfur	0.25 #/M
Trt # 8	Duraphite 12	3.2 oz./M
Trt # 9	Fungicide Control	Every 4 wks
Trt # 10	Not Treated Control	

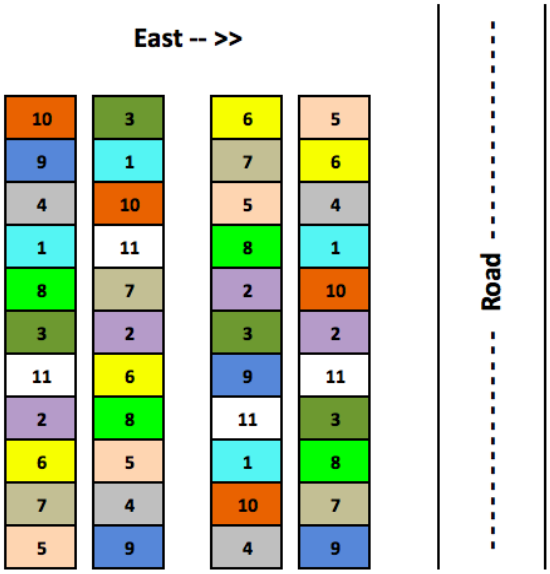


Comparing iron sulfate versus chelated iron for the suppression of Microdochium patch on annual bluegrass putting greens in the absence and presence of phosphorous acid.

Presenter: Clint Mattox

Preliminary data suggests that chelated iron suppresses *Microdochium nivale* in a laboratory setting. In order to see how this will work on golf course putting greens, this field study will compare the effects of chelated iron versus iron sulfate with or without the addition of phosphorous acid on the incidence of Microdochium patch on an annual bluegrass putting green. If chelated iron suppresses Microdochium patch in the field, turfgrass managers may be able to mitigate Microdochium patch while reducing the risk of the blackening of turfgrass leaves and the thinning of the turfgrass sward as has been shown with iron sulfate.

Trt # 1	0.1 # Fe/M (Iron Sulfate)	0.5 # FeSO4/M
Trt # 2	0.1 # Fe/M (Iron Sulfate) Duraphite 12	0.5 # FeSO4/M 3.2 oz./M
Trt # 3	0.2 # Fe/M (Iron Sulfate)	1.0 # FeSO4/M
Trt # 4	0.2 # Fe/M (Iron Sulfate) Duraphite 12	1.0 # FeSO4/M 3.2 oz./M
Trt # 5	0.1 # Fe/M (DTPA)	0.9 #/M
Trt # 6	0.1 # Fe/M (DTPA) Duraphite 12	0.9 #/M 3.2 oz./M
Trt # 7	0.2 # Fe/M (DTPA)	1.8 #/M
Trt # 8	0.2 # Fe/M (DTPA) Duraphite 12	1.8 #/M 3.2 oz./M
Trt # 9	Duraphite 12	3.2 oz./M
Trt # 10	Fungicide Control	Every 4 weeks
Trt # 11	Not Treated Control	



2018-2019 Simplot *Microdochium* Patch Trial

Presenter: Alyssa Cain

The goal of this trial was to evaluate various rates, intervals, and combinations of products containing Duraphite with either iron sulfate + Ambient Plus pigment, or Super Six Sulfur + Ambient Plus. Duraphite was applied alone for comparison. A second goal was to evaluate two different iron sulfate products – Extreme Green 20 and Extreme Green 16. Turfcide 400 was applied every 4 weeks as a fungicide control for comparison. Percent disease data is shown for latest rating date - February 13th, 2019.

Preliminary Results:

- Combination treatments applied every 14 days were more effective than applications made every 21 days (See Trt 5 vs. 7), or when Duraphite was applied alone every 14 days.
- Super 6 sulfur + Duraphite (Trt 4) applied every 14 days had more disease but was not statistically different than Extreme Green 20 + Duraphite (Trt 5)
- Although Extreme Green 20 had lower disease than Extreme Green 16 at both 14 and 21 days, the Duraphite and iron sulfate rates were not consistent across treatments to make any conclusions.
- Observation: early infected plots seem to recover more quickly with some treatments.

Trt	Product	Rate (fl. oz./M)	Interval	Percent Disease 02/13/19	
1	Non-treated	-	-	81.3	a
2	Duraphite 12	3.14	14 day	28.8	b
3	SPEXP19001P	-	14 day	36.3	b
4	Super 6 (6 lbs S/gal) + Duraphite 12 + Ambient Plus	5.34* 3.14 0.37	14 day	9.3	cd
5	Extreme Green 20 + Duraphite 12 + Ambient Plus	6.0 6.0 0.37	14 day	5.3	d
6	Extreme Green 16 + Duraphite 12 + Ambient Plus	4.0 3.14 0.37	14 day	9.6	cd
7	Extreme Green 20 + Duraphite 12 + Ambient Plus	6.0 6.0 0.37	21 day	13.5	cd
8	Extreme Green 16 + Duraphite 12 + Ambient Plus	6.0 4.5 0.37	21 day	22.5	bc
9	Turfcide 400	6.0	28 day	1.9	d
* 0.25 lbs elemental S/1,000 ft^2				LSD @ 0.05	14.75

2018 - 2019 Simplot M. Patch Trial
Oregon State University
Initiated: 09-26-18
Area 36' x 21.5'

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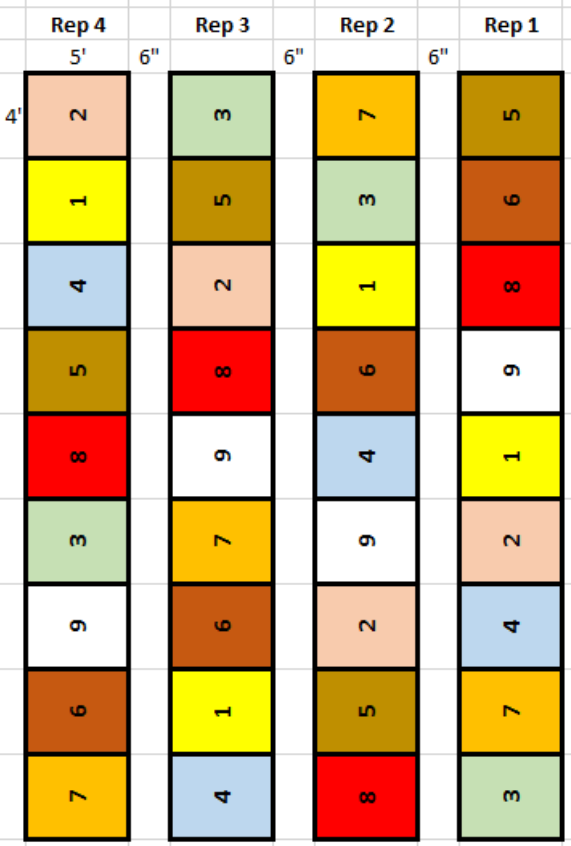


Trt #	Programs	Rates (fl oz/M)	Interval
1	Nontreated	-	-
2	Duraphite 12	3.14	14
3	SPEXP19001P	3.14	14
4	Super 6 + Duraphite + Ambient Plus	5.34 + 3.14 + 0.37	14
5	Extreme Green 20* + Duraphite + Ambient Plus	6.0 + 6.0 + 0.37	14
6	Extreme Green 16* + Duraphite + Ambient Plus	4.0 + 3.14 + 0.37	14
7	Extreme Green 20 + Duraphite + Ambient Plus	6.0 + 6.0 + 0.37	21
8	Extreme Green 16* + Duraphite + Ambient Plus	6.0 + 4.5 + 0.37	21
9	Turfcide 400	6.0	28

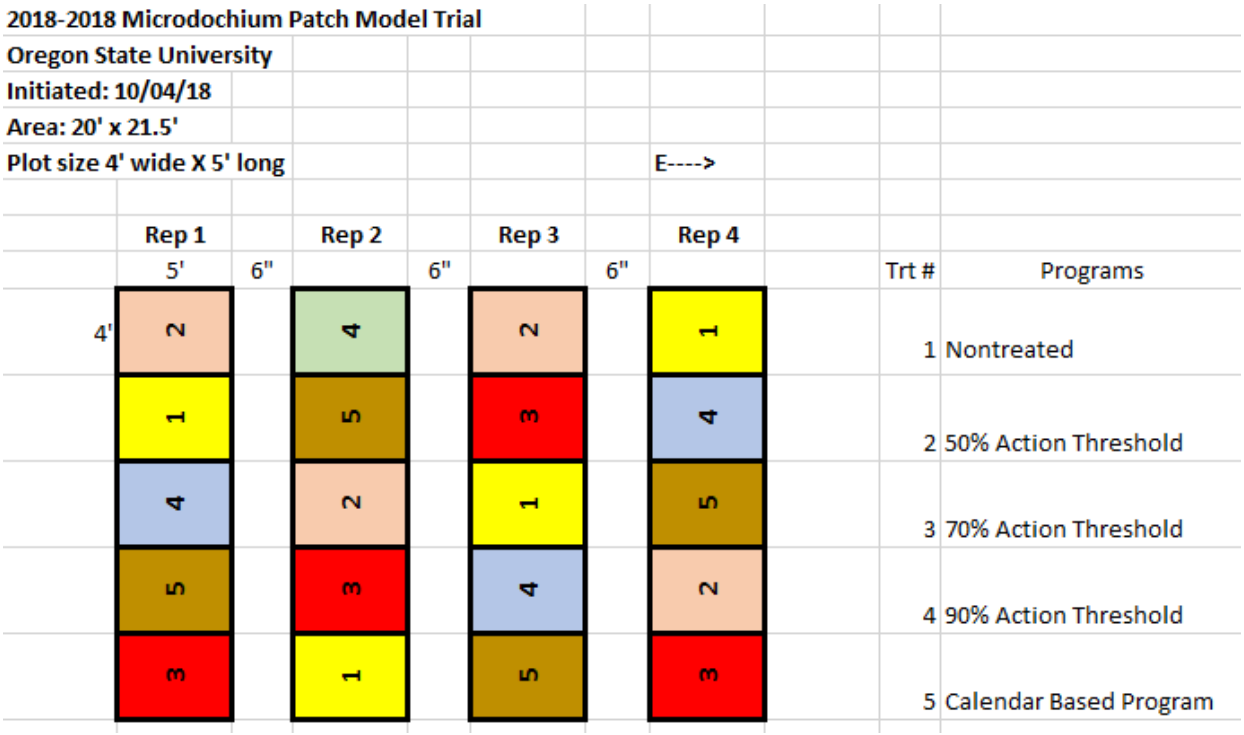
* 20 % Fe
* 16 % Fe

Using Weather Data to Create a Model to Time Fungicide Sprays for the Control of *Microdochium* patch of Annual Bluegrass Putting Greens

Presenter: Emily Braithwaite, Research Assistant

For the last two years, Oregon State University has been working with Dr. Paul Koch from the University of Wisconsin, and 3 other sites around the world, to collect *Microdochium* patch disease and concurrent weather data with the intent of developing a spray model for *Microdochium* patch control (i.e. the model would tell you when to spray based on certain weather criteria). After all the data was collected and analyzed, a model was created in 2018.

Beginning in the fall of 2018, we began testing Dr. Koch's model using action spray thresholds from the model of 50, 70, and 90%. Note: you would spray sooner using a 50 percent threshold vs. a 70 or 90 percent threshold. Once each threshold is met, Instrata fungicide was applied at 5.6 fl. oz. per 1,000 ft^2. Following an application, another application will only be made to those plots if two things occur: 4 weeks has passed since the last spray and the model hits the appropriate threshold. Additionally, the three model thresholds are being compared to a calendar based spray schedule (i.e. monthly applications) which was initiated on October 4th, 2018 and an untreated control.



2018-2019 Turf Fuel *Microdochium* Patch Trial

Presenter: Emily Braithwaite

The goal of this trial is to evaluate the effects of mineral oil, phosphites, fertilizers, and biological products on control of *Microdochium* patch on an annual bluegrass putting green.

Oregon State University
Initiated: 11/20/18

South ----->

Trt #	Treatments	Rate	Units	Interval
1	Untreated	na	na	na
2	Banner Maxx	2.0	fl. oz.	4
3	EAC 1100		fl. oz.	2
4	EAC 1713		fl. oz.	2
5	EAC 1504		wt. oz.	2
6	EAC 1100 + EAC 1504		fl. oz./wt. oz.	2
7	EAC 1100 + EAC 1713		fl. oz./fl. oz.	2
8	Rotation:			
	EAC 1100 + EAC 1713		fl. oz.	
	EAC 1100 + EAC 1504		fl. oz./wt. oz.	
	EAC 1100 + EAC 1713		fl. oz.	2
9	DR-II-D2 Mineral Oil + Element 6 + Gr. Supreme	3.0 + 3.0 + 3.0	fl. oz.	2
10	DR-II-D2 Mineral Oil + Element 6	3.0 + 3.0	fl. oz.	2
11	MZ-23 + Element 6	4.0 + 3.0	fl. oz.	2
12	Experimental Extract	8.0	fl. oz.	2
13	OSU Experimental - 02		fl. oz.	4

Effects of Different Rates and Combinations of N-P-K Applied Fall through Spring on

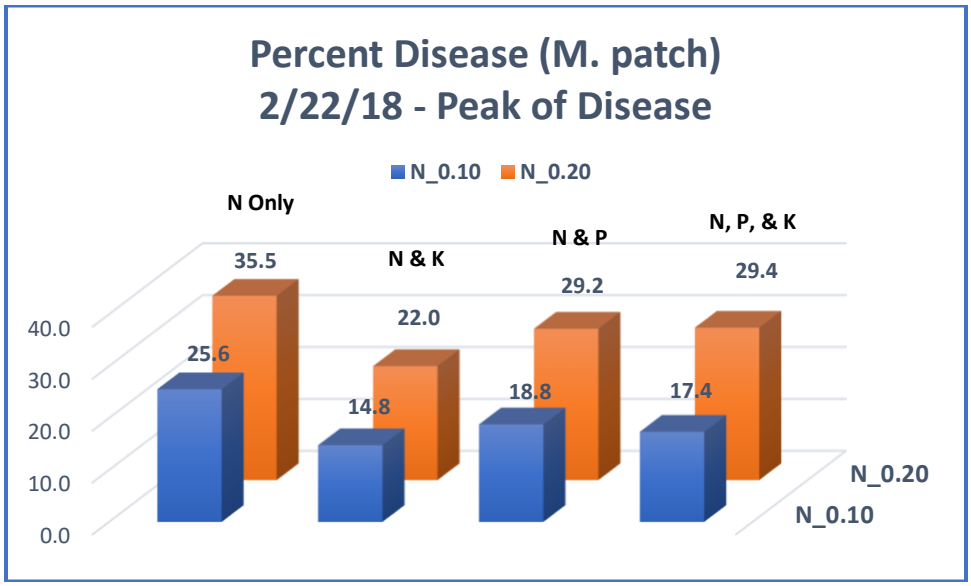
Microdochium Patch Incidence

Presenter: Brian McDonald

Fertilizer applications made monthly Oct – thru April. Products applied: urea (0.10 & 0.20 lbs N), phosphoric acid (0.025 lbs P - 0-52-0), and muriate of potash (0.10 lbs K - 0-0-60). Additionally, Duraphite [3.2 fl. oz. (2017- 2018) & 6.4 fl oz (2018-2019)] plus Sulfur (0.25 lbs S/1,000 ft^2) are applied every 4 weeks.

In year one, the data suggests that you should not apply urea alone but rather add potassium or potassium plus phosphorous. The treatments with the most disease at each respective rate (either 0.10 or 0.20 lbs N/1,000ft^2/month) were the nitrogen only treatments. Additionally, the higher rate of N resulted in more disease than the lower rate averaged across each N rate. However, the high rate of N with potassium had less disease than the low rate of urea by itself. The least disease occurred on plots that received 0.10 lbs of N/1,000ft^2/month with potassium only.

2017 – 2018 Data – Peak of Disease

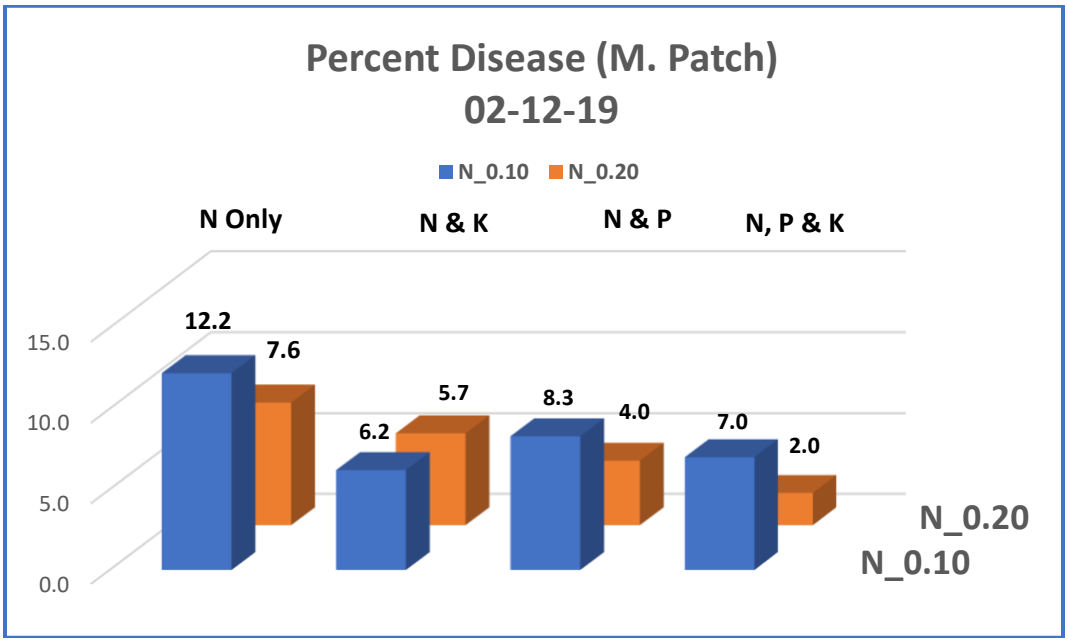


2017 – 2018 Results:

- Plots treated with N only had the most disease at each rate of N.
- Plots treated with the **high** rate of nitrogen had more disease.

- Plots treated with N + K had the least disease at each level of N.

2018 – 2019 Data – 02-12-19



2018 – 2019 Preliminary Results

- Plots treated with "N only" had the most disease at each rate of N.
- Plots treated with the **low** rate of nitrogen had more disease.
- At the low rate of N, N + K had the least disease.
- At the high rate of N, N + P + K had the least disease.

2018-2020 Melspring Evaluation of Experimental Biostimulant Formulations

Presenter: Emily Braithwaite

This experiment was designed to determine the effects of Melgreen manganese, silicon, and copper products, the first two of which include seaweed extracts, with and without phosphite treatments on golf greens, and under *Microdochium* patch disease pressure in the winter. The trial was designed as a 4 x 3 factorial, treatments applied every 14 days, listed below:

No Phosphite	With Simulate-8 Phosphite	With Duraphite
1. NPK Only	5. NPK Only	9. NPK Only
2. NPK + Micros	6. NPK + Micros	10. NPK + Micros
3. NPK + Micros + Program 1	7.NPK + Micros + Program 1	11. NPK + Micros + Program 1
4. NPK + Micros + Program 2	8. NPK + Micros + Program 2	12. NPK + Micros + Program 2

Trt	Products	Rate	Trt	Products	Rate
1	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6	4.1 fl. oz./M 4.1 fl. oz./M	7	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Peters Professional Micros + Melgreen Program 1[z] + Stimul-8 Phosphite	4.1 fl. oz./M 4.1 fl. oz./M 0.08 oz./M 3.1 fl. oz./M
2	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Peters Professional Micros	4.1 fl. oz./M 4.1 fl. oz./M 0.08 oz./M	8	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Peters Professional Micros + Melgreen Program 2[y] + Stimul-8 Phosphite	4.1 fl. oz./M 4.1 fl. oz./M 0.08 oz./M 3.1 fl. oz./M
3	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Peters Professional Micros + Melgreen Program 1[z]	4.1 fl. oz./M 4.1 fl. oz./M 0.08 oz/M see footnote	9	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Duraphite 12	4.1 fl. oz./M 4.1 fl. oz./M 3.1 fl. oz./M
4	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Peters Professional Micros + Melgreen Program 2[y]	4.1 fl. oz./M 4.1 fl. oz./M 0.08 oz/M see footnote	10	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Peters Professional Micros + Duraphite 12	4.1 fl. oz./M 4.1 fl. oz./M 0.08 oz./M 3.1 fl. oz./M
5	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Stimul-8 Phosphite	4.1 fl. oz./M 4.1 fl. oz./M 3.1 fl. oz./M	11	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Peters Professional Micros + Melgreen Program 1[z] + Duraphite 12	4.1 fl. oz./M 4.1 fl. oz./M 0.08 oz./M 3.1 fl. oz./M
6	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Peters Professional Micros + Stimul-8 Phosphite	4.1 fl. oz./M 4.1 fl. oz./M 0.08 oz/M 3.1 fl. oz./M	12	Simplot Liquid 12-2-12 + Simplot Liquid 18-3-6 + Peters Professional Micros + Melgreen Program 2[y] + Duraphite 12	4.1 fl. oz./M 4.1 fl. oz./M 0.08 oz./M 3.1 fl. oz./M

[z] Program 1 consists of Cu (0.15 fl. oz./M) applied every 4 weeks Sep-Mar, Mn (0.09 fl. oz./M) every 4 weeks Apr-May, and Si (1.5 fl. oz./M) alternated with Cu applied every 2 weeks Jun-Aug

[y] Program 2 consists of Cu (0.15 fl. oz./M) alternated with Si + Mn (1.5 fl. oz./M + 0.09 fl. oz./M) applied every 2 weeks year round.

Preliminary Results

- Plots treated with phosphites (Trts 5 – 12) have significantly less disease than those plots treated with only fertilizers and micronutrients (Trts 1 – 4).

- Duraphite has provided better Microdochium patch control than Stimul-8 which may be related to the rate of phosphorous acid applied from each product. Note: we have not been told the phosphorous acid concentration of the Stimul-8 product.

- There have been no significant differences between the 4 different fertility programs (NPK only, NPK + Micros, NPK + Micros + Program 1, and NPK + Micros + Program 2) for Microdochium patch control. Note: program 1 only contained copper and has no seaweed extracts.

2018 - 2020 Melgreen Fertilizer Trial

Oregon State University

4' x 10' plot size

Initiated: 05-21-18

W---->

	Rep 4		Rep 3		Rep 2		Rep 1
	8'	2'	8'	2'	8'	2'	8'
4'	1		6		8		3
	5		12		3		9
	9		4		5		8
	7		10		11		12
	2		5		7		1
	12		11		1		6
	4		8		2		11
	6		3		12		7
	11		7		9		4
	8		1		6		10
	3		9		10		2
	10		2		4		5