Fighting Pink and Gray Snowmold: Combining Forces with New and Old Fungicides 2001-2002

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Purpose of Trials

- Determine the efficacy of combinations of new and old fungicides in different environments
- Continued search for replacements for mercurial compounds
- PCNB to control gray snow mold has become ineffective in McCall, ID (Resistance?)
- Disease causes great devastation under favorable climatic conditions
- Gray snow mold is the fifth most important disease in U.S.

New Fungicides

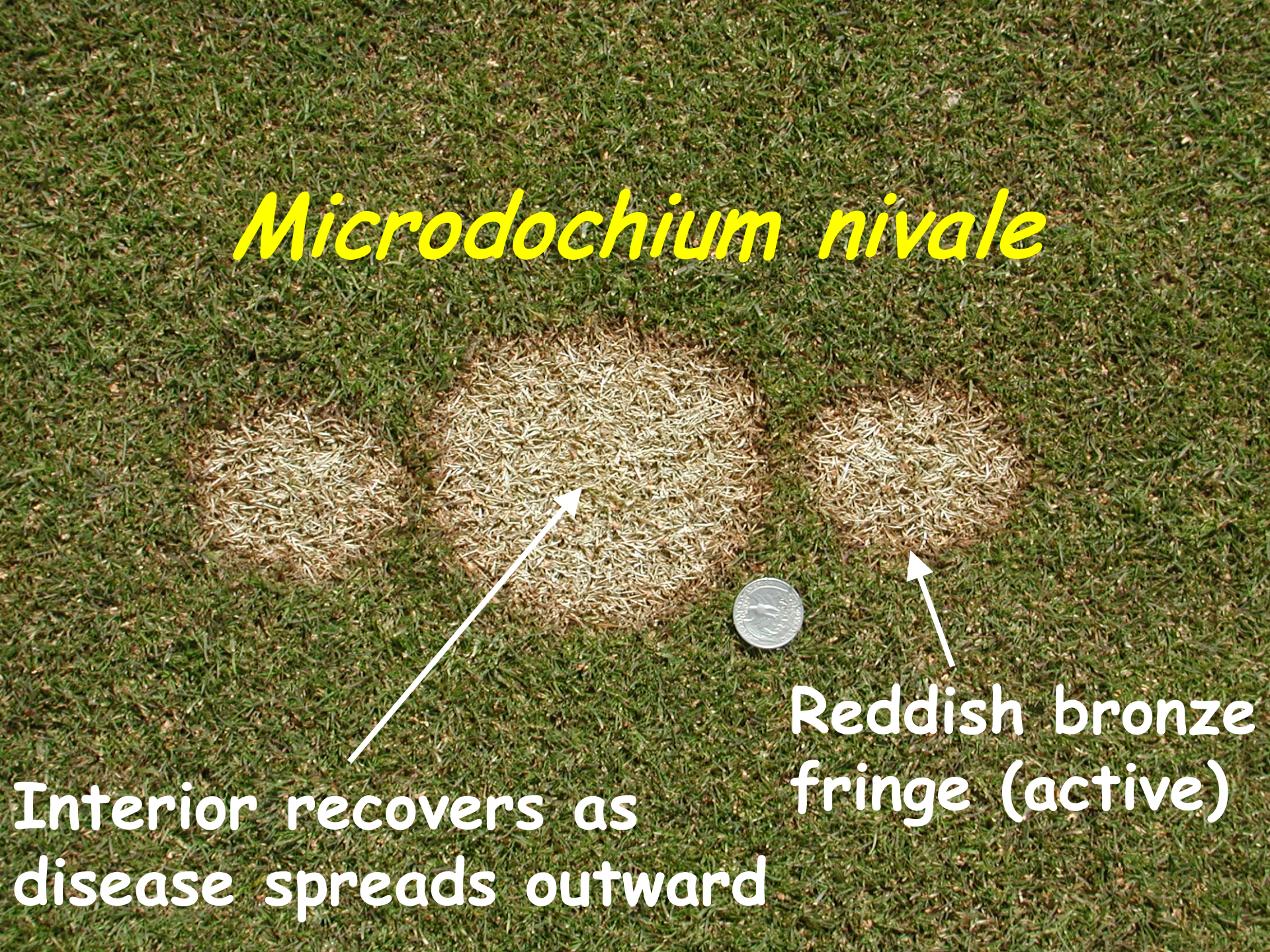
- **Triticonazole**: **'Chipco Triton 1.67SC'** and **'Chipco Triton 70WDG'**; triazole; contact and systemic activity; (late 2003)
- **Flutinoxinil**: **'Medallion 50WP'**; new mode of action: amino acid uptake and plasma membrane; contact and preventative (March 2001)
- ***Trichoderma atroviride***: **'Plant Helper'** Fungal 'hyperparasite' extracted from soil in sub-arctic Alaska; liquid and powder; (late 2001)
- **Azoxystrobin**: **'Heritage 50WDG'**, derived wood decaying fungi; single site; broad spectrum (1998)

Old Fungicides

- **Propiconazole**: '**Banner MAXX**'; triazole; systemic; broad spectrum
- **Iprodione**: '**Chipco 26GT**'; multi-site of action; contact and preventative; broad spectrum
- **Chloroneb**: '**Fungicide V**'; pythium and gray snow mold (*T. incarnata*)
- **PCNB**: '**Turfcide 400**', '**FFII w/14-3-3**'; multi-site; broad spectrum
- **Chlorothalinil**: '**Daconil Ultrex**', '**Daconil 5G**' (DG Lite 75) multi-site; broad spectrum; contact; new dispersible granule (DG) formulation (Experimental)

Pink Snow Mold

- *Microdochium nivale*
  - Favors cool moist condition with alternating snow and rain
  - Little or no snow cover needed
  - Circular patches up to 20" diameter
  - Reddish bronze to light gray
  - Reddish bronze fringe transitioning to pink upon exposure to sunlight

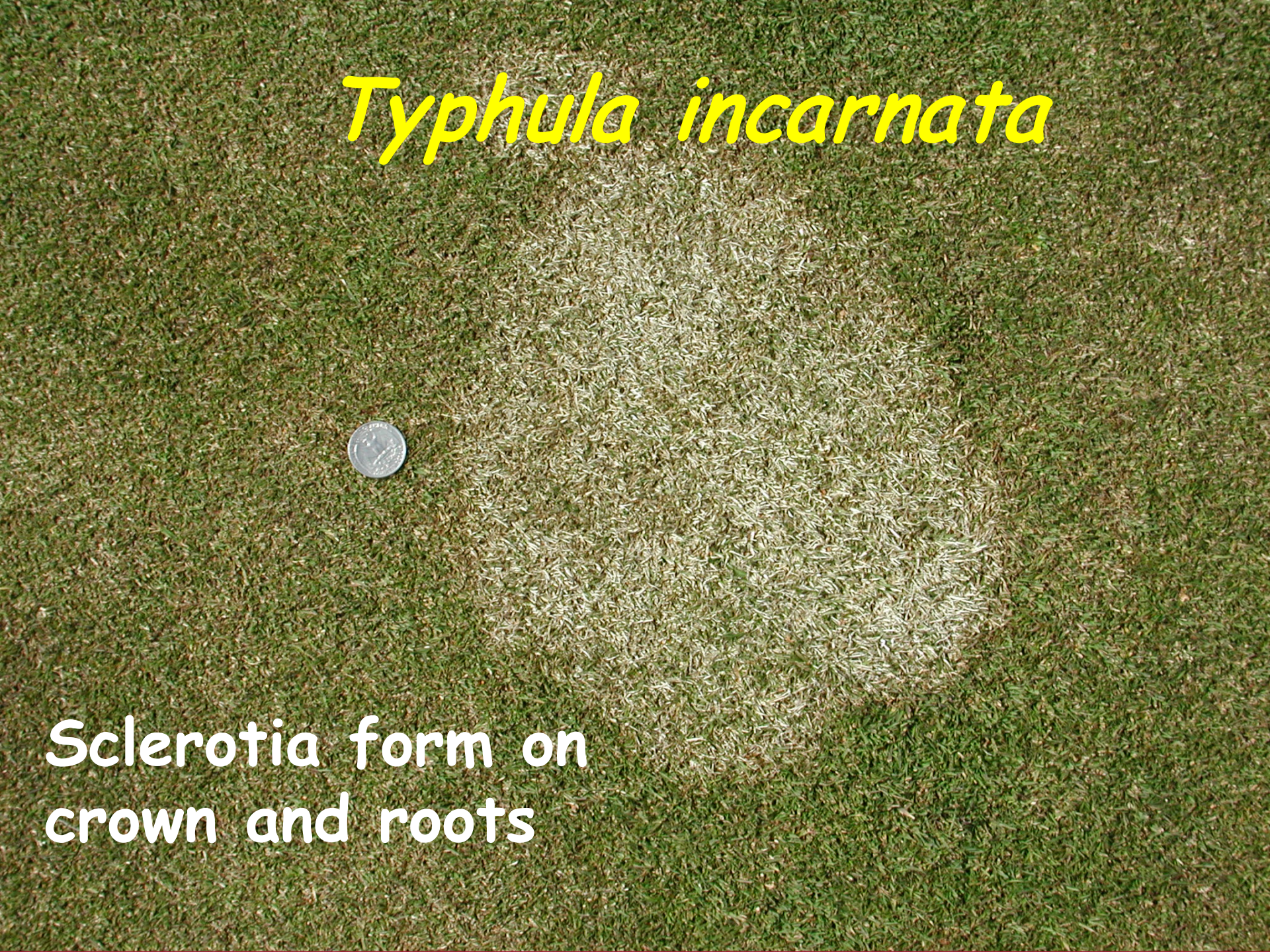

Microdochium nivale
Interior recovers as disease spreads outward
Reddish bronze fringe (active)

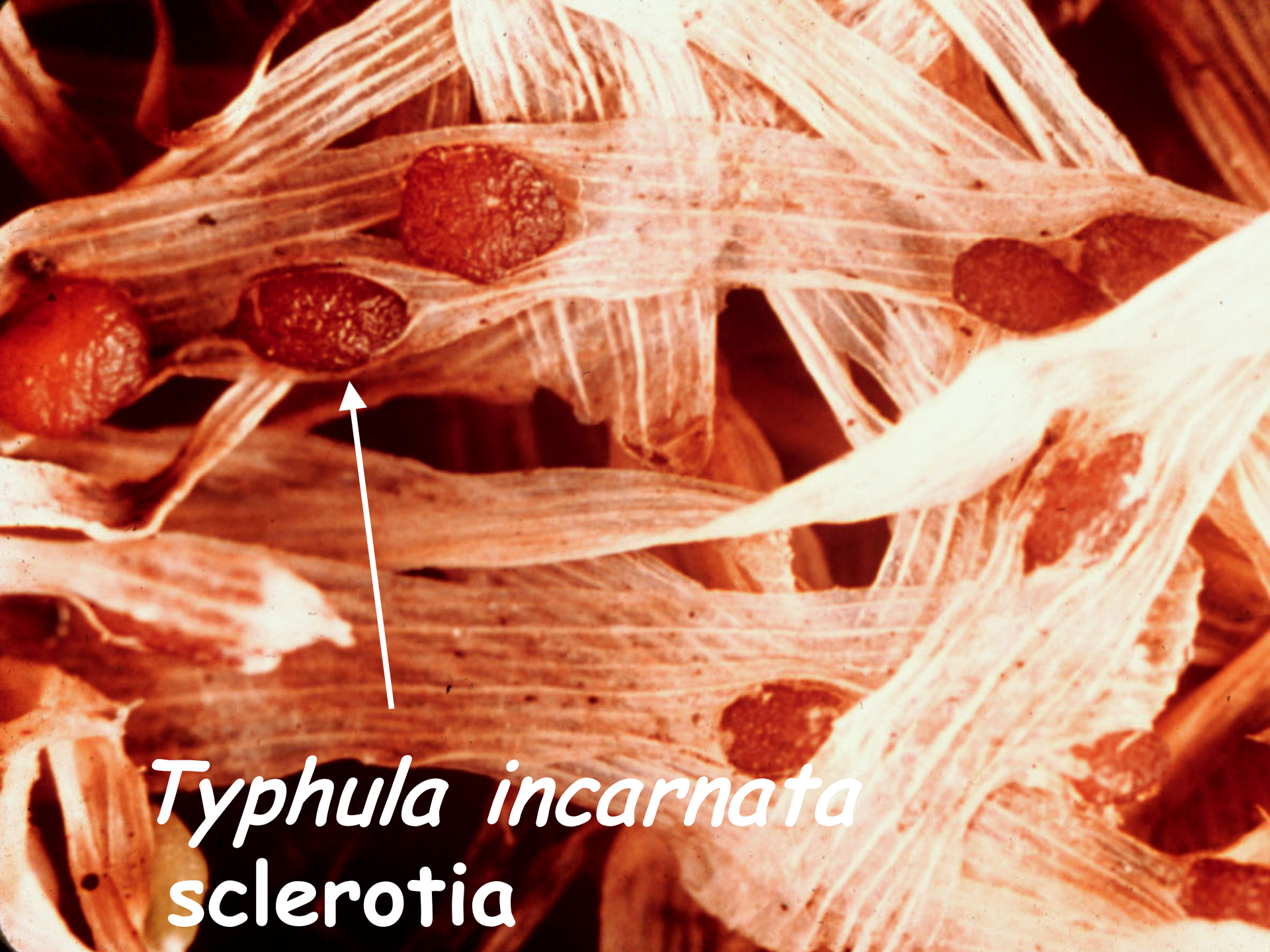
Gray Snow Mold

- *Typhula incarnata*
  - >60 days snow cover
  - Sporcarps: pinkish gelatinous looking upright structures
  - Variable patches of gray/white matted turf
  - Sclerotia: up to 5 mm diameter red/brown
  - Less destructive


T. incarnata sporocarps

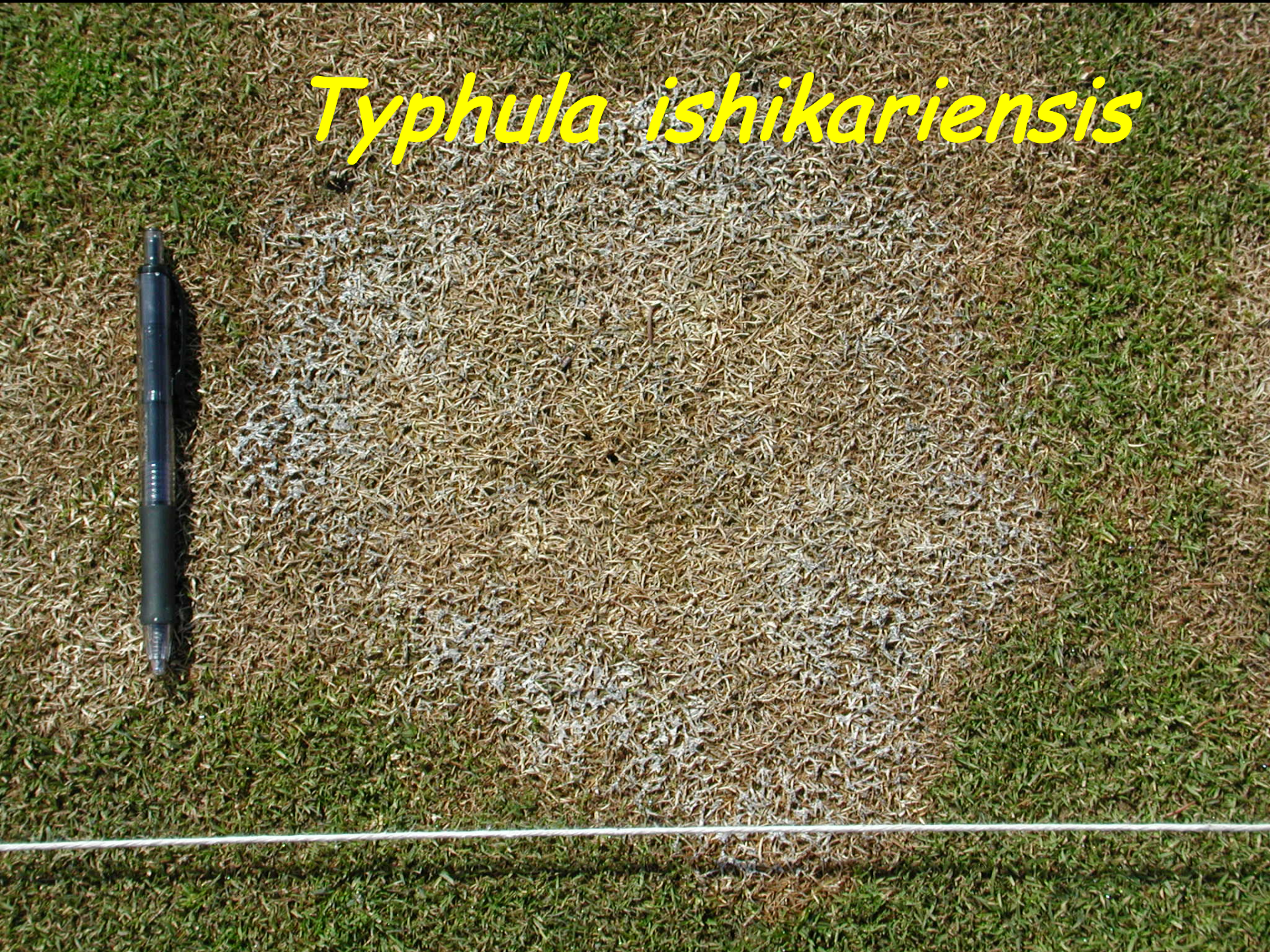

T. incarnata sporocarps in low cut turf in the fall


Typhula incarnata
Sclerotia form on
crown and roots


Typhula incarnata
sclerotia

Typhula ishikariensis

- >100 days snow cover
- Sporocarps: silvery-white; very small
- Bleached crust of mycelium after drying
- Sclerotia: <2 mm dark brown/black visible on crust ('Speckled' snow mold)
- Destructive


Typhula ishikariensis


Typhula ishikariensis
sclerotia

Snow Mold Research Sites

- **Pullman, WA** (most years pink snow mold)
- **Whitefish, MT** (*T. ishikariensis*, *T. incarnata* and pink snow mold)
- **McCall, ID** (predominately *T. ishikariensis* and some *T. incarnata*)

Pullman, WA Research Site

- 6400 ft^2 research green constructed with 8" sand over soil with drainage
- 99 % 'Putter' CB maintained at 0.15", 5 lb N/1000 ft^2
- Annual precip. 21"- 22"
- Application date: typically late Nov.-early Dec.
- Snow cover variable


Washington State University
Research Green

Whitefish, MT Research Site

- 3000 ft^2 practice green of sand over soil, topdressed with sand for several years
- 90 % 'Penncross' CB; 10 % annual bluegrass maintained at 0.135", 4.65 lb N/1000 ft^2
- Annual precip. 22"- 23"
- Application date: typically late Oct.- early Nov.
- Snow cover: mid Nov. to mid March


Whitefish Lake Golf Course
Practice Green

McCall, ID Research Site

- 2500 ft^2 nursery area on native soil
- 75 % 'Providence' CB, 25 % annual bluegrass maintained at 0.25 inches, 1.5 lb N/1000 ft^2
- Annual precip. 27"
- Application date: typically late Oct.
- Snow cover: early Nov. to late April

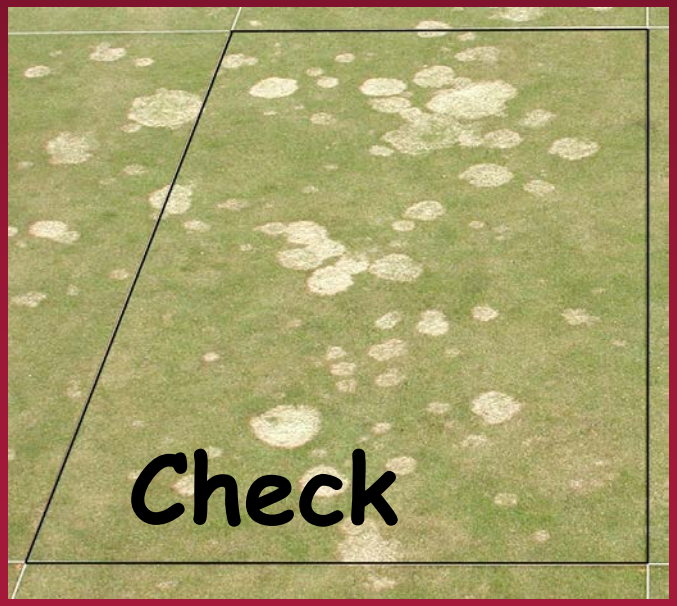

City of McCall GC
Bentgrass nursery area

Snow Conditions

Location	Avg. snow accum. (inches)	2001-02 snow accum. (inches)	Avg. snow cover (days)	2001-02 snow cover (days)
Pullman, WA	29	68	<30	60
Whitefish, MT	75	78	120	135
McCall, ID	138	185	150	165

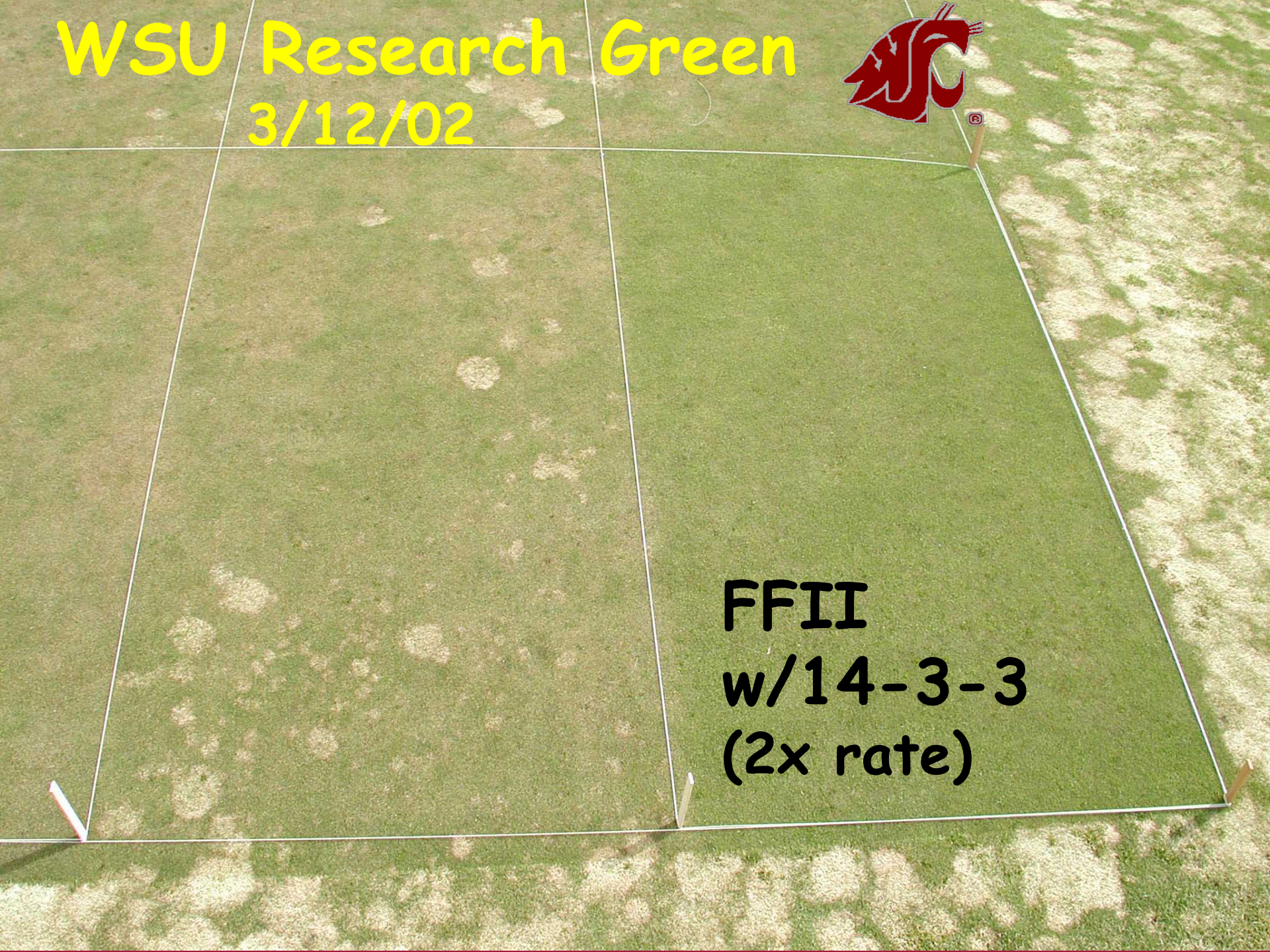
Pullman, WA Results

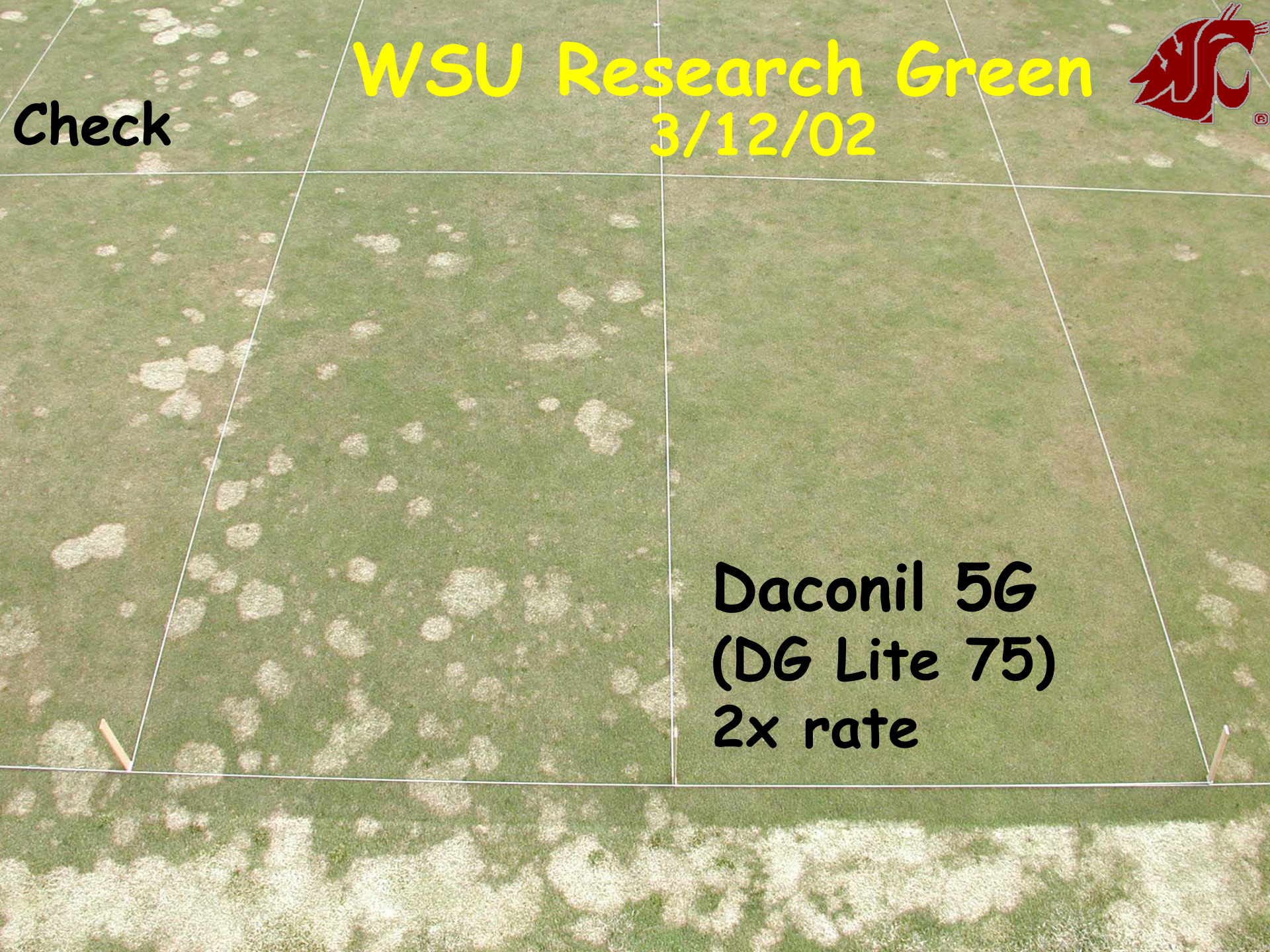
- Research Green
  - 60 days snow cover
  - 90 % *T. incarnata*, 10 % *M. nivale*
  - Non-treated areas with 22-58% disease

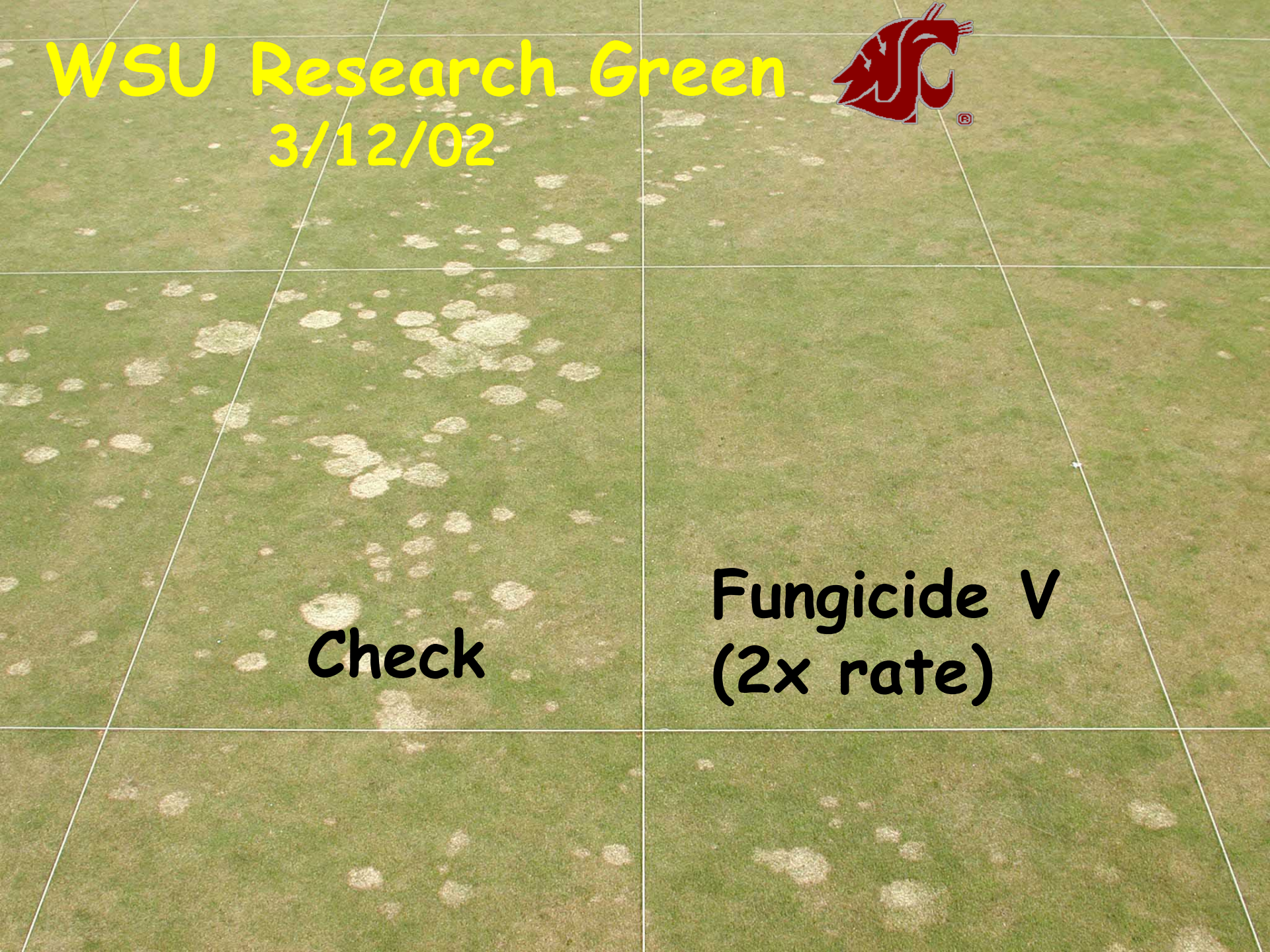


Granular fungicides from 'The Andersons'. Pullman, WA. 3/12/02.

Treatment	Rate (lbs prod/M)	Disease area	Turf quality	Cost
FFII w/ 14-3-3	6.50	0.0	8.0	14.50
Daconil 5G (DG Lite 75)	2.98	0.0	6.0	NA
Fungicide V	6.00	0.3	6.0	14.40
Daconil 5G (DG Lite 75)	1.94	3.7	4.3	NA
Check	0	56.7	1.3	Free


WSU Research Green
3/12/02
FFII
w/14-3-3
(2x rate)


WSU Research Green
3/12/02
Check
Daconil 5G
(DG Lite 75)
2x rate


WSU Research Green
3/12/02
Check
Fungicide V
(2x rate)

Plant Helper (*Trichoderma atroviride*). Pullman, WA. 3/12/02.

Treatment	Rate (fl oz/M)	Disease area	Turf quality	Cost
Plant Helper	5.9	23.3	3.3	2.10
Check	0	20.3	3.5	Free

WSU Research Green
3/12/02

Fungicide Combinations. Pullman, WA. 3/12/02

Treatment	Rate (prod/M)	Disease area	Turf quality	Cost
Turficide 400	12.0floz	0.0	7.0	4.10
Chipco 26GT + Daconil Ultrex + Turfcide 400	4.0 fl oz 5.5 oz 8.0 fl oz	0.0	6.7	9.75
Chipco 26GT + Chipco TritonWDG+ Turfcide 400	4.0 fl oz 3.3 oz 8.0 fl oz	0.0	6.3	6.65+
Chipco Triton SC + Medallion	1.0 fl oz 0.5 oz	1.0	6.3	7.90+
Chipco 26 GT+ Chipco Triton WDG	4.0 fl oz 3.3 oz	5.3	5.0	3.90+
Check	0	25.7	3.3	Free

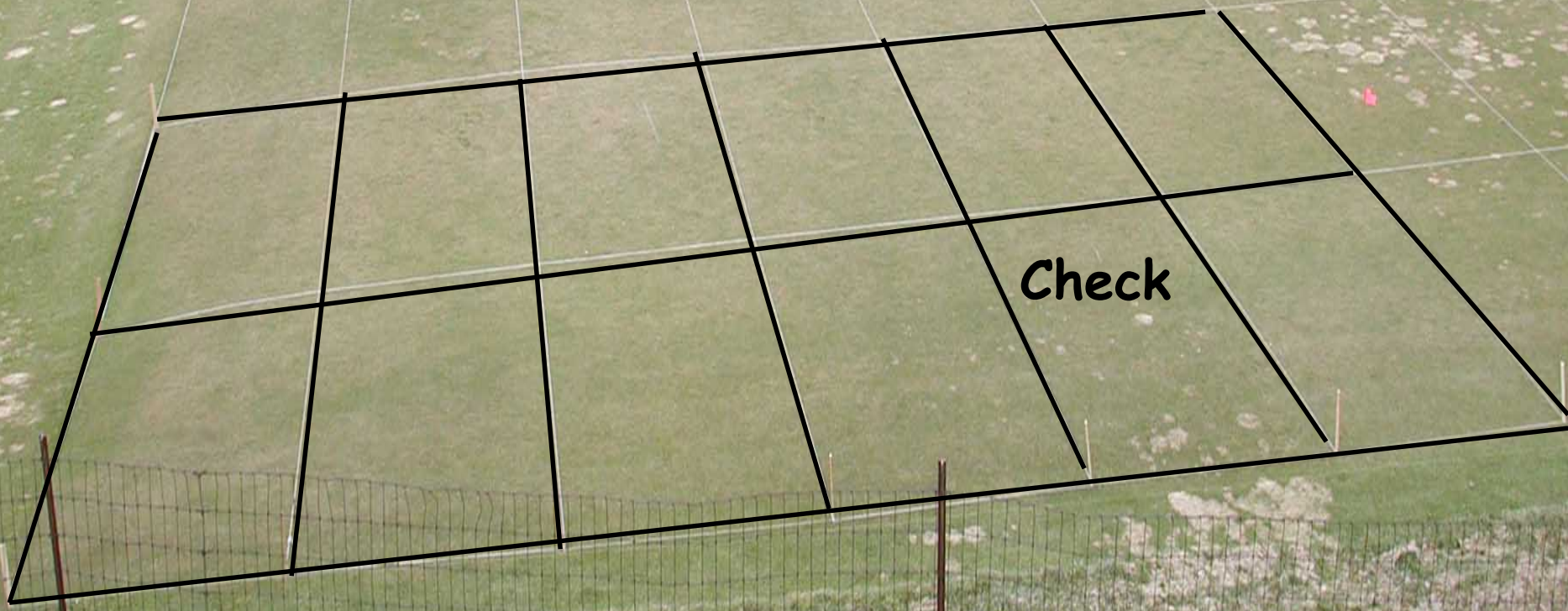

WSU Research Green
3/12/02
26GT +
Triton 70WDG
Check
Turficide 400
(12 fl oz rate)

Fungicide Combinations. Pullman, WA. 3/5/02.

Treatment	Rate (prod/M)	Disease area	Turf quality	Cost
Medallion + Heritage	0.5 oz 0.4 oz	0.0	6.0	16.50
Medallion + Heritage + Daconil Ultrex	0.5 oz 0.4 oz 5.0 oz	0.0	6.0	19.30
Heritage + Banner MAXX + Daconil Ultrex	0.4 oz 3.0 fl oz 5.0 oz	0.0	6.0	16.65
Turfcide 400	12.0 fl oz	0.0	5.7	4.10
Medallion + Banner MAXX	0.5 oz 4.0 fl oz	0.0	5.7	15.85
Daconil Ultrex	5.0 oz	0.3	5.3	2.85
Check	0	21.7	2.9	Free

WSU Research Green

3/12/02 Rep I



Whitefish, MT Results

- **Practice Green**
  - 90 % *T. ishikariensis*, 10 % *T. incarnata*, trace *M. nivale*
  - Non-treated areas with 37 % disease

Fungicide Combination. Whitefish Lake GC.4/10/02.

Treatment	Rate (prod/M)	Disease area	Turf quality	Cost
Medallion + Heritage	0.5 oz 0.4 oz	0.7	7.0	16.50
Chipco 26GT + Chipco Triton WDG+ Turfcide 400	4.0 fl oz 1.0 fl oz 8.0 fl oz	1.0	6.0	6.65+
Heritage + Banner MAXX + Daconil Ultrex	0.4 oz 3.0 fl oz 5.0 fl oz	1.7	6.0	17.40
Medallion + Banner MAXX + Daconil Ultrex	0.33 oz 3.0 fl oz 5.0 oz	2.3	6.3	14.00
Turfcide 400	12.0floz	2.3	6.0	4.10

Fungicide Combination.Whitefish Lake GC. 4/10/02

Treatment	Rate (prod/M)	Disease area	Turf quality	Cost
FFII w/ 14-3-3	6.5 lbs	2.7	7.0	14.60
Chipco Triton SC + Heritage	1.0 fl oz 0.4 oz	2.7	6.7	8.60+
Medallion + Daconil Ultrex	0.5 oz 5.0 fl oz	3.0	6.0	10.70
Chipco 26GT + Chipco Triton WDG	4.0 fl oz 3.3 oz	7.7	5.0	3.90+
Fungicide V	6.0 lbs	19.0	4.3	14.40
Check	0	36.7	2.7	Free
Plant (Fungus) Helper?	5.9 fl oz	63.3	1.7	2.10


Whitefish Lake Golf Course
4/10/02
Medallion + Daconil Ultrex
Chipco Triton + Heritage
Heritage + Banner MAXX
+ Daconil Ultrex


Whitefish Lake Golf Course
4/10/02
Check
Plant Helper (Fungus Helper?)
FFII w/14-3-3
(2x rate)

McCall, ID Results

- **Bentgrass nursery area**
  - 95 % *T. ishikariensis*, 5 % *T. incarnata*
  - Non-treated areas with >95 % disease

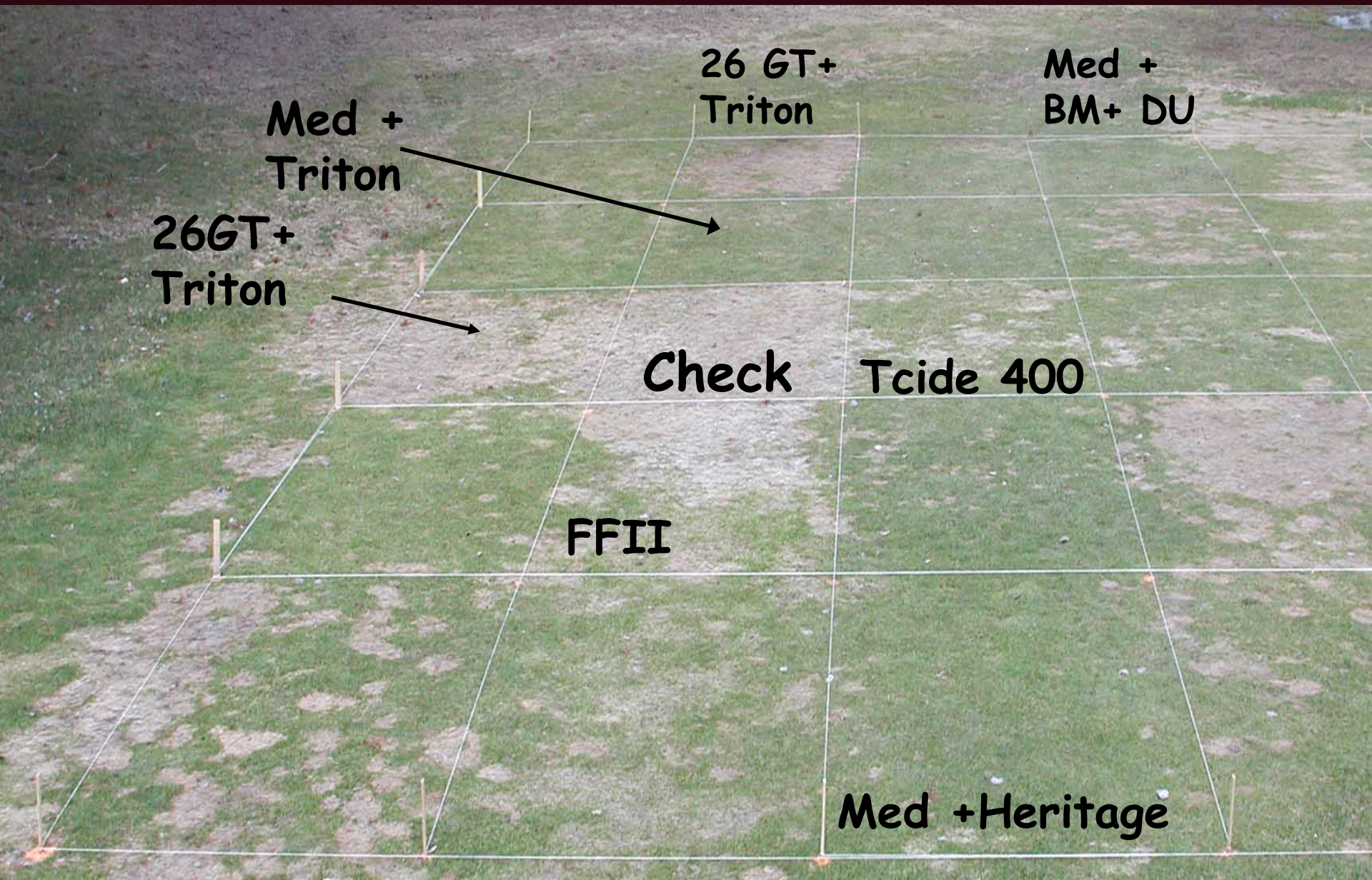
Fungicide Combinations. City of McCall GC. 5/3/02

Treatment	Rate (prod/M)	Disease area	Turf quality	Cost
Medallion + **Banner MAXX +** **Daconil Ultrex**	0.33 oz 3.0 fl oz 5.0 fl oz	6.0	6.0	14.00
Heritage + Banner MAXX + Daconil Ultrex	0.4 oz 3.0 fl oz 5.0 oz	6.3	6.0	17.40
Medallion + **Chipco Triton SC**	0.5 oz 1.0 fl oz	6.7	5.7	7.90+
Medallion + **Heritage +** **Daconil Ultrex**	0.33 oz 0.4 oz 5.0 oz	7.3	5.3	19.35
Medallion + **Banner MAXX**	0.5 oz 4.0 fl oz	8.0	5.7	15.85

Fungicide Combinations. City of McCall GC. 5/3/02. Con't

Treatment	Rate (prod/M)	Disease area	Turf quality	Cost
Chipco 26GT + Chipco TritonWDG+ Turfcide 400	4.0 fl oz 1.0 oz 8.0 fl oz	50.0	3.0	6.65+
Fungicide V	6.0 lbs	65.0	2.0	14.40
Turfcide 400	12.0 fl oz	78.3	1.7	4.10
FFII w/ 14-3-3	6.5 lbs	91.7	1.3	14.60
Check	0	95.0	1.3	Free

City of McCall Golf Course 5/3/02



Summary

- More options w/ less severe winter conditions.
  - Single multi site (old) fungicides.
  - Combine 1 new with 1 old.
- Fungicide combination a must in areas with severe winters.
  - 2 and 3 way combinations: (Medallion, Heritage, Chipco Triton 70WDG, Banner MAXX, Daconil Ultrex, (Chipco 26 GT and PCNB?))
- Minimize resistance rotate your fungicides

Summary con't

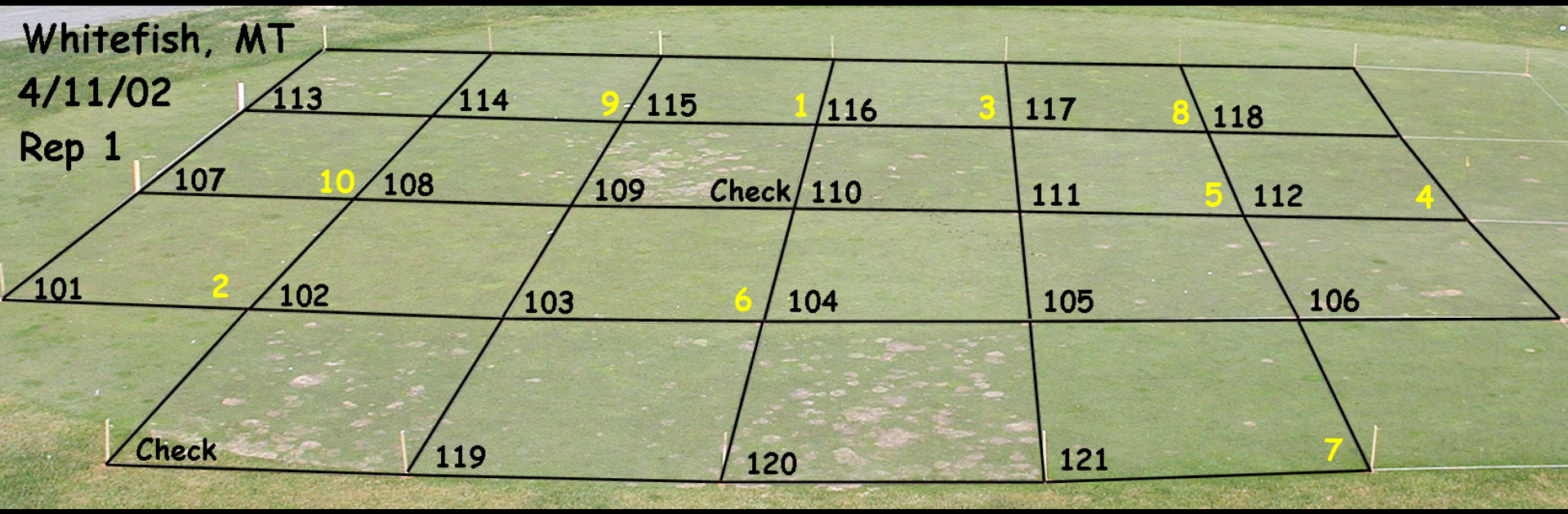
- PCNB still very effective in Pullman and Whitefish
- PCNB ineffectiveness in McCall (Resistance?)

Acknowledgments

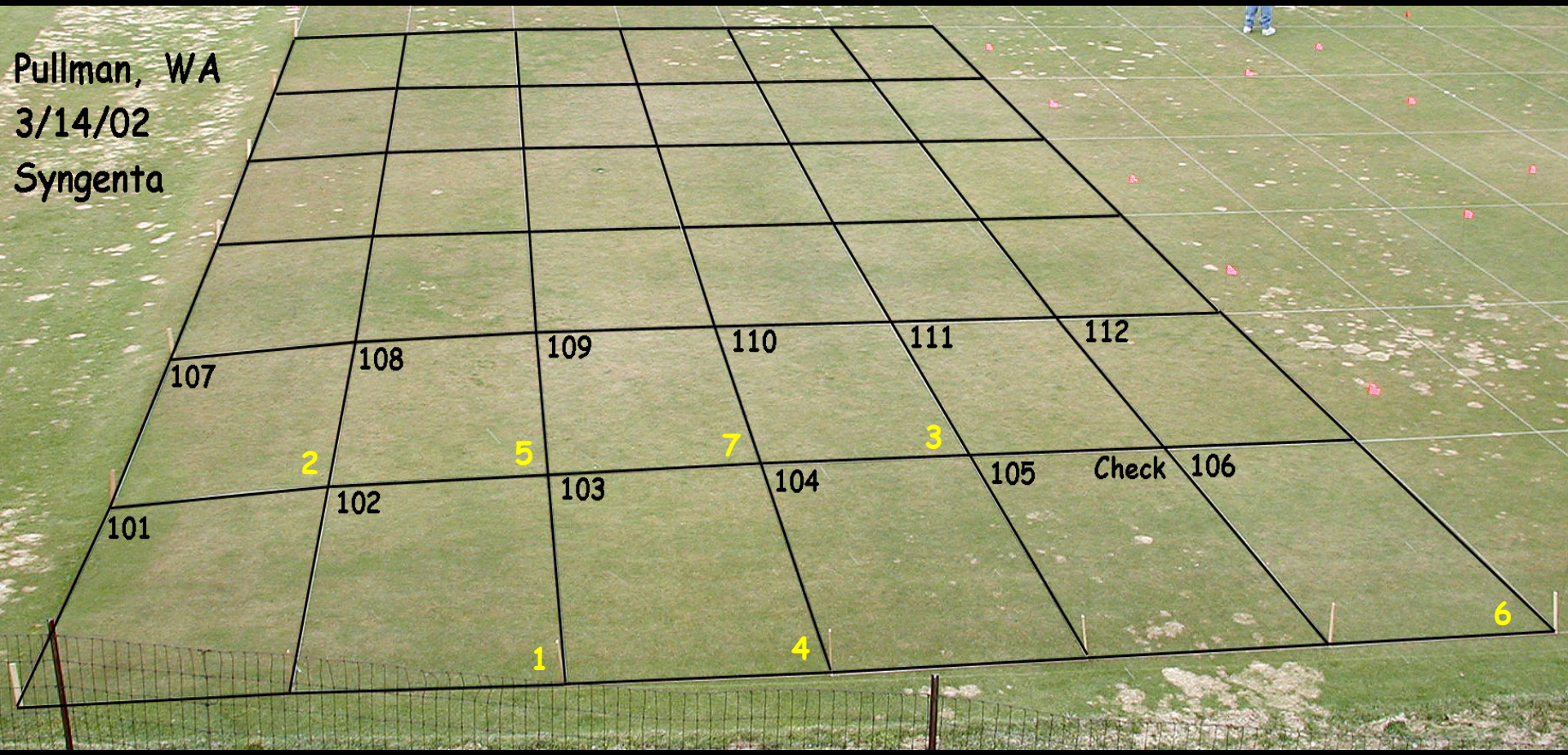
- Whitefish Lake Golf Course (Dick Collins)
- City of McCall Golf Course (Dan Pillard)

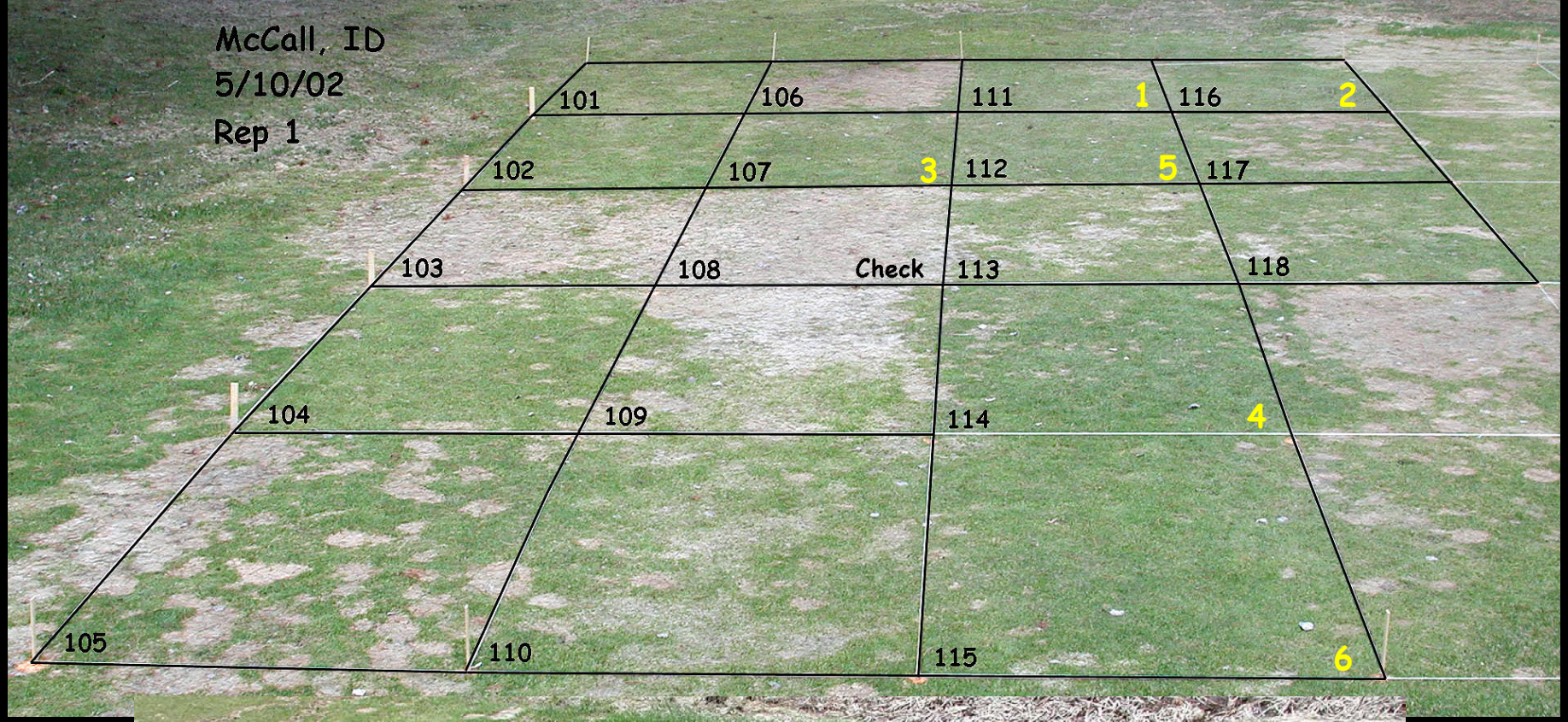
- The Andersons
- Syngenta
- Aventis
- USGA
- NTA


Hey! Maybe that deer would work for next to nothing
Typical Gov't employees
Questions?


Whitefish, MT
4/11/02
Rep 1
113
114
9
115
1
116
3
117
8
118
107
10
108
109
Check
110
111
5
112
4
101
2
102
103
6
104
105
106
Check
119
120
121
7

WSU Research Green




McCall, ID
5/10/02
Rep 1
101
106
111
1
116
2
102
107
3
112
5
117
103
108
Check
113
118
104
109
114
4
105
110
115
6


McCall, ID
5/10/02
Rep 1 cont.
119 Triton
120 Medallion
219 Medallion
220 Triton
319 Medallion
320 Triton


black sclerotia bodies
Typhula ishikari


WSU Research Green
3/12/02
Check
26GT +
Triton 70 WDG+
Turfcide 400