

Snow Mold Control on Putting Greens in the Intermountain West with Prolonged Snow Cover

IEGCSA 2010 Pesticide Short Course

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Hayden Lake Country Club. Hayden Lake, ID

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Overview

- Status of PCNB
- 3 snow molds
- Control Strategies
 - Cultural
 - Preventative fungicides

Ineligible for Reregistration

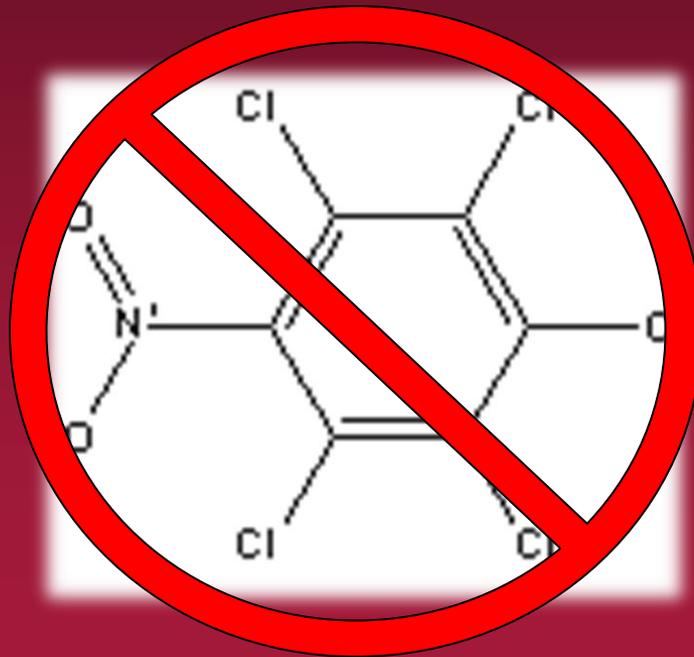
- **Fall 2006** Reregistration Eligibility Decision (RED) designated PCNB as “ineligible for reregistration” for use on turf and many other crops
 - High Risk/ Low Benefit: Numerous highly effective, economically feasible alternatives with lesser environmental risk
- Public comment ended **Jan. 2007**
- EPA began crafting a response to comments to complete the reregistration process

Stop Sale

- **August 2010.** EPA issued a Stop Sale Order on the grounds that the company (AMVAC) did not identify a trace impurity in the product in a submission to the agency called a Confidential Statement of Formula (CSF).
- AMVAC filed an action against EPA seeking emergency relief from this Stop Sale of all it's EPA-registered PCNB product line.

Stop Sale

- **September 3, 2010** the United States District Court for the District of Columbia denied the Company's motion for emergency relief from this Stop Sale Order.



(FYI) Canada Stop Use

- This year Health Canada issued a Stop Use of all PCNB products for use on turf effective Dec. 31, 2010.

Snow molds

- **Pink snow mold**
 - *Microdochium nivale*
- **Gray snow molds**
 - *Typhula incarnata*
 - *Typhula ishikariensis*

Pink Snow Mold

(Microdochium nivale)

- Cool moist conditions 30-60 °F (Spring, Fall, Winter)
- Does not require snow cover
- Circular patches, reddish bronze to light gray, up to 20" diameter
- Pink fungal spores build-up on leaves

Microdochium nivale



Gray Snow Molds

Typhula incarnata

Typhula ishikariensis

Typhula incarnata

- >60 days continuous snow cover
- Unfrozen ground (34-36 °F)
- Circular patches of gray/white matted turf
- **Sclerotia**: spherical up to 5 mm diameter red/brown embedded in dead leaf tissue (spring). Over summer on the soil surface.
- **Sporocarps**: pink fleshy club-shaped upright structures 20 mm tall (fall only)
- Less destructive

Typhula incarnata



Sclerotia



T. incarnata sporocarps in
low cut turf in the fall



Typhula ishikariensis

- >100 days continuous snow cover
- Unfrozen ground (34-36 °F)
- Circular patches of gray/white matted turf or a bleached crust of mycelium after drying
- **Sclerotia**: <2 mm dark brown/black visible on crust (spring). Over summer on soil surface.
- **Sporocarps**: silvery-white fleshy club-shaped; very small <15 mm tall (very rare) (fall only)
- Destructive

Typhula ishikariensis



Sclerotia

The image shows a close-up of a plant stem with several dark, circular sclerotia. Two yellow arrows point to two of these sclerotia, which are embedded in the stem tissue. The stem is light brown and shows some longitudinal texture.

Disease Severity

Snow cover

Diseases

100 days

Typhula ishikariensis

60 days

Typhula incarnata

0 days

Microdochium nivale

McCall, ID

167 days snow cover

95 % *T. ishikariensis*

5 % *T. incarnata*

CHECK

Typhula Blight = OMG

Disease Control Strategies

- Cultural controls to reduce disease severity
- Preventative fungicide control

Cultural control

- Control thatch
 - Aerify/topdress
 - Verticut/topdress
- Avoid excess nitrogen late in the fall
- High K fertilizer in the fall (2-3 lbs/M)
- Mow as long as possible
- Surface drainage
- Clear debris
- Trim or remove trees

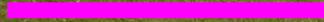
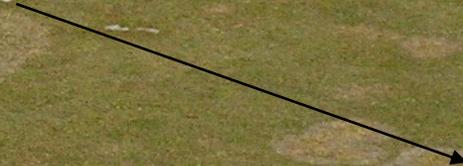
Preventative Fungicide Control

- Late fall application of fungicides before permanent snow cover

Fungicide Timing

Pink snow mold control

Trial fungicide applications



Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec

DMI Fungicides

(broad spectrum, systemic, resistance potential: medium)

- **Banner MAXX, Spectator Ultra**

• Propiconazole

- **Trinity, Triton FLO**

• Triticonazole

- ~~Lynx~~, **Torque**

• Tebuconazole

- **Bayleton**

• Triadimefon

Strobilurin Fungicides

(broad spectrum, systemic, single-site MOA, resistance potential: high)

- **Heritage**
 - azoxystrobin
- **Compass**
 - trifluroxystrobin
- **Insignia**
 - pyraclostrobin

Contact Fungicides

(broad spectrum, multi-site MOA, resistance potential: Low)

- **Daconil, Manicure Ultra**
 - chlorothalonil
- **Medallion** (inhibits germination of fungal spores)
 - fludioxonil

Fungicides

- **26GT, 18 Plus**
 - iprodione
- **Cleary's 3336**
 - thiophanate-methyl
- **Terraclor, Turfcide 400, Revere 4000, FFII 14-3-3**
 - PCNB, Quintozene

Single formulations with 2 to 3 fungicides

- **Syngenta**

- **Instrata** (propiconazole + fludioxonil + chlorothalonil)
- **Headway** (propiconazole + azoxystrobin)
- **Concert** (propiconazole + chlorothalonil)
- **Renown** (azoxystrobin + chlorothalonil)

Single formulations with 2 fungicides

- Bayer

- **Interface** (iprodione + trifloxystrobin + StressGard)

- **Tartan** (triadimefon + trifloxystrobin + StressGard)

- **Reserve** (triticonazole + chlorothalonil + StressGard)

- Cleary's

- **Spectro 90** (thiophanate-methyl + chlorothalonil)

3-way Fungicide Combinations

Gray snow mold



Pink snow mold



Syngenta

Instrata

(propiconazole + fludioxonil + chlorothalonil)

165 days
snow cover
25% Pink
75% Gray

Instrata 9.3 fl oz

Instrata 11 fl oz

Instrata 6 fl oz

CHECK

Rated: 5/4/06

Syngenta Snow Mold Study. City of McCall Golf Course. McCall, ID

McCall, ID 2006-07

150 days snow cover

25% Pink and 75% Gray

Treatment	Disease		
	Rate (prod/M)	(% area infected)	Turf quality
Instrata 3.61SE	11 fl oz	0.0 a	5.3 a
Instrata 3.61SE	9 fl oz	0.3 a	5.0 ab
Instrata 3.61SE	5 fl oz	8.3 a	4.0 abc
Banner MAXX (propiconazole) + Medallion 50WP (fludioxonil)	4 fl oz 0.33 oz	13.0 a	3.7 bc
CHECK	0	87.3 b	1.0 d

Interface (iprodone + trifloxystrobin + SG) +

Triton FLO (triticonazole + SG)

Less expensive than Instrata

**Bayer Snow Mold Trial 2008-09. Chewelah Golf and Country Club.
Chewelah, WA. Rated 4/13/09.**

**122 days
Snow cover
40% pink/60% gray**

Interface (6 fl oz/M) + Triton FLO

Triton FLO + Compass + Daconil Ultrex

Interface (4 fl oz/M) + Triton FLO

Check

Chewelah 2008-09

122 days snow cover

40% Pink/60% Gray

Fungicide	Rate (prod/M)	Disease (% area infected)	Turf quality
Interface + Triton FLO	4 fl oz 0.85 fl oz	6.7 b	5.0 a
Interface + Triton FLO	5 fl oz 0.85 fl oz	1.7 ab	6.3 a
Interface + Triton FLO	6 fl oz 0.85 fl oz	0.3 a	6.3 a
Instrata	9.3 fl oz	0.0 a	5.7 a
Check	0	73.3 c	1.0 b

Chewelah 2009-10
100 days snow cover
40% Pink/60% Gray

Fungicide	Rate (prod/M)	Disease (% area infected)	Turf quality
Interface + Triton FLO	4 fl oz 0.85 fl oz	0.0 b	6.0 ab
Interface + Triton FLO	5 fl oz 0.85 fl oz	1.0 b	6.2 a
Interface + Triton FLO	6 fl oz 0.85 fl oz	0.0 b	6.3 a
Instrata	9.3 fl oz	0.0 b	5.0 bc
Instrata	11 fl oz	0.0 b	4.3 c
Check	0	23.3 a	2.7 d

Bayer snow mold trial 2009-2010

Chewelah Golf and Country Club

Interface 6 fl oz + Triton FLO 0.85 fl oz

**100 days snow cover
30% pink/70% gray**



CHECK

Bayer

(Torque) **Lynx** (tebuconazole + SG) +
26GT (iprodione + SG) +
Daconil Ultrex (chlorothalonil)

(Torque) **Lynx** (tebuconazole + SG) +
Compass (trifloxystrobin) +
Daconil Ultrex (chlorothalonil)

**Pink and Gray Snow Mold Control with Fungicides from Bayer
Chewelah Golf and Country Club. Chewelah, WA 2006-07.**

**120 days snow cover
40% pink/60%gray**

**Lynx 1 fl oz + 26GT 4 fl oz +
Daconil Ultrex 5 oz**

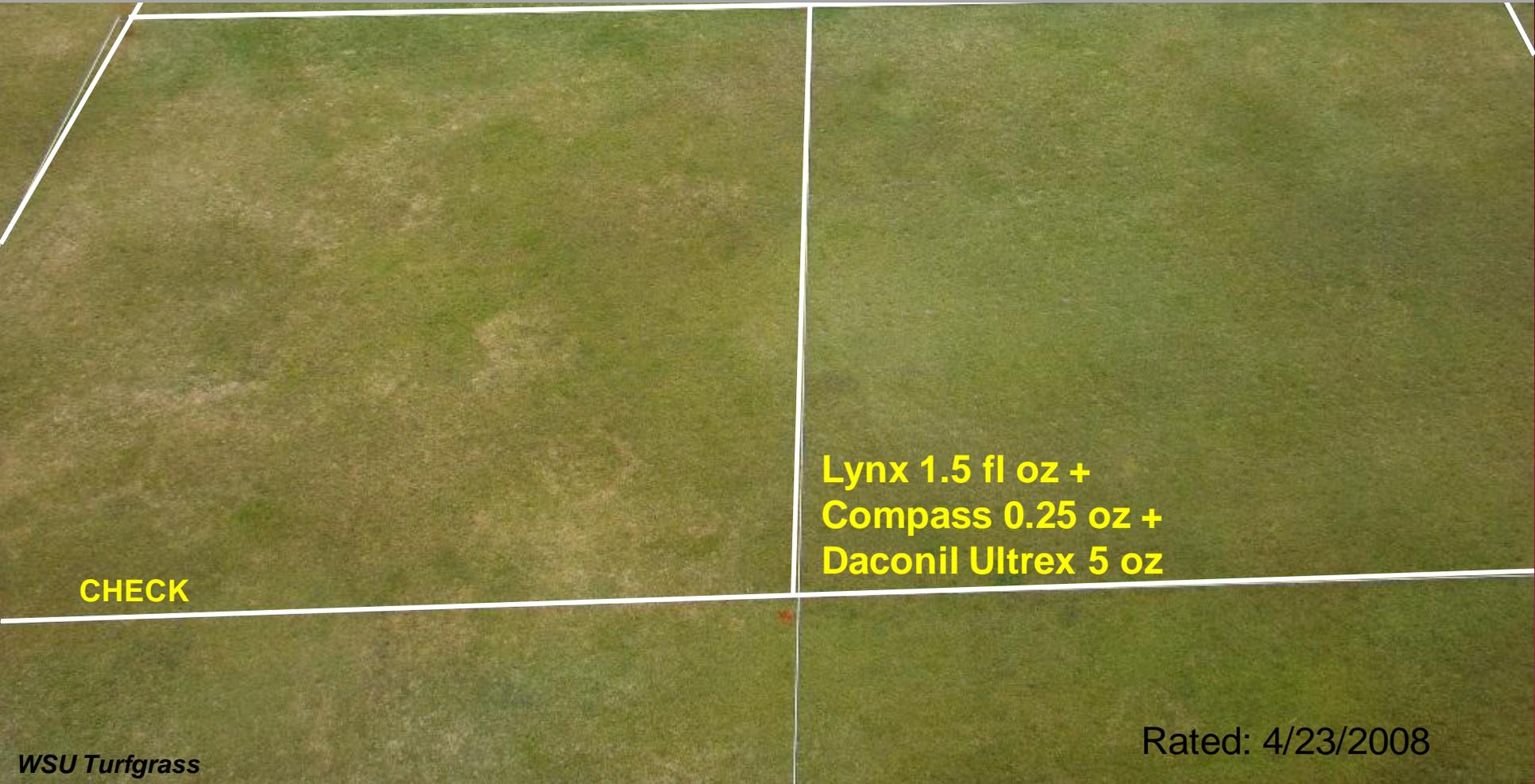
[Compass + Lynx] 2 fl oz + Daconil Ultrex 5 oz

[Compass + Lynx] 2 fl oz

**Lynx 1 fl oz + 26GT 4 fl oz +
Daconil Ultrex 5 oz**

Bayer Snow Mold Trial 2007-2008
Chewelah Golf and Country Club
Chewelah, WA

140 days snow cover
20% pink/80% gray



CHECK

**Lynx 1.5 fl oz +
Compass 0.25 oz +
Daconil Ultrex 5 oz**

Rated: 4/23/2008

WSU Turfgrass

Chewelah 2007-08

140 days snow cover

20% Pink and 80% Gray snow mold

Fungicide	Rate (prod/M)	Disease (% area infected)	Turf quality
Lynx + Compass + Daconil Ultrex	1.5 fl oz 0.25 oz 5 oz	0.0 b	5.2 ab
Lynx + Chipco 26GT + Daconil Ultrex	1.5 fl oz 4 fl oz 5 oz	1.7 b	5.0 ab
Instrata	9 fl oz	1.3 b	3.3 cdef
CHECK	0	27.3 a	2.7 ef

LESCO

Insignia (pyraclostrobin) +

18 Plus (iprodione) +

Manicure Ultra (chlorothalonil)

No DMI Fungicide

165 days

LESCO 2005-06. City of McCall Golf Course. McCall, ID.

snow cover

25% Pink

75% Gray

CHECK

Par-Flo 12 fl oz (late)

Insignia 0.7 oz (early) +
18 Plus 4 fl oz (late) +
Manicure Ultra 5 oz (late)

18 Plus 4 fl oz (early) +
Manicure Ultra 5 oz (early) +
Revere 4000 8 fl oz (late)

Snow Mold Research 2010-11

- Reduced rates of 2 and 3-way fungicide combinations for snow mold control on fairways (Chewelah and McCall)
- Combinations with Interface, Reserve, and Tartan (Pullman, Chewelah, and McCall)
- PAR (Proprietary pigment concentrate) which is similar to StressGard
 - Instrata + PAR vs Bayer fungicides w/ StressGard

City of McCall Golf Course
10/27/10

Instrata 9.3 fl oz + PAR

Instrata 9.3 fl oz

(Interface 6 fl oz + Triton FLO) w/StressGard

Summary

- PCNB?
- Cultural methods to minimize disease impact
- Prolonged snow cover (pink and gray snow mold):
 - Instrata 9 to 11 fl oz
 - Interface 6 fl oz + Triton FLO 0.85 fl oz
 - (Torque) Lynx 1 fl oz + (26GT 4 fl oz or Compass 0.25 oz) + Daconil Ultrex 5 oz
 - Insignia 0.7 oz + 18 Plus 4 fl oz + Manicure Ultra 5 oz very good control and turf quality without a DMI fungicide
- Minimize resistance rotate fungicides (especially strobilurins)

WSU Disclaimer

“Some of the pesticides discussed in this presentation were tested under an experimental use permit granted by WSDA. Application of a pesticide to a crop or site that is not on the label is a violation of pesticide law and may subject the applicator to civil penalties up to \$7,500. In addition, such an application may also result in illegal residues that could subject the crop to seizure or embargo action by WSDA and/or the U.S. Food and Drug Administration. **It is your responsibility to check the label before using the product to ensure lawful use and obtain all necessary permits in advance.**”

A photograph of a golf course in a mountainous region. The foreground and middle ground show green grass with several large, irregular patches of snow. In the background, there is a dense forest of tall evergreen trees and some bare deciduous trees. The sky is not visible.

Questions?

<http://turf.wsu.edu/>