

# Updates in snap bean disease management research



## **Amanda Gevens & Stephen Jordan**

Associate Professor & Extension Plant Pathologist; Outreach Specialist, Dept. of Plant Pathology, Univ. of Wisconsin-Madison

January 17, 2019– 10:00-10:25AM  
Wisconsin Agribusiness Classic  
Alliant Energy Center  
Madison, WI

# Root Rot & Damping Off Diseases

Early season, stand-reducing diseases result from infection by one or more soilborne pathogens during periods of cool and wet soil

Fungi: *Rhizoctonia solani*, *Fusarium* spp.

Oomycetes: *Aphanomyces euteiches*, *Pythium* spp.



# **Root Rot & Damping Off Diseases**

## ***Management Approaches***

Varietal resistance

Crop rotation out of susceptible legume crops for ~3 years

Avoid planting during times when soil will remain consistently  $< \sim 50^{\circ}\text{F}$  and wet

Seed-applied or at-plant applied fungicides for reducing disease

# **Root Rot & Damping Off Diseases**

## ***Research Objectives***

MWFPA funded project (2018-2020): Investigating at-plant fungicide treatments for improving snap bean stand and crop health

Document the effectiveness of reduced risk fungicides applied as either seed-applied and/or in-furrow applied treatments to limit early season, stand-limiting disease to develop effective management pro snap beans in WI.



# Root Rot & Damping Off Diseases

## *In-row Treatment Study 2018*

- Location: Hancock ARS 2018
- 2 Varieties: Huntington and Hystyle (no seed treatments)
- Planting Date: 2 July
- Fungicides applied: drench in-row over the top of covered seed
- Data collected: emergence, plant vigor, foliar and root symptoms, and yield
- Harvested: 10 September

Treatment Number				
Huntington	Hystyle	Treatment	rate/1000 rf	Application Timing <sup>z</sup>
1	9	Non-treated Control		NA
2	10	Ridomil Gold	0.42 fl oz	In-furrow
3	11	Ridomil Gold + Quadris	0.42 fl oz + 0.8 fl oz	In-furrow
4	12	Quadris	0.8 fl oz	In-furrow
5	13	Velum Prime	0.45 fl oz	In-furrow
6	14	Serenade	4.4 fl oz	In-furrow
7	15	Regalia	4.4 fl oz	In-furrow
8	16	Double Nickel	2.2 fl oz	In-furrow

# Root Rot & Damping Off Diseases

## *In-row Treatment Study 2018*

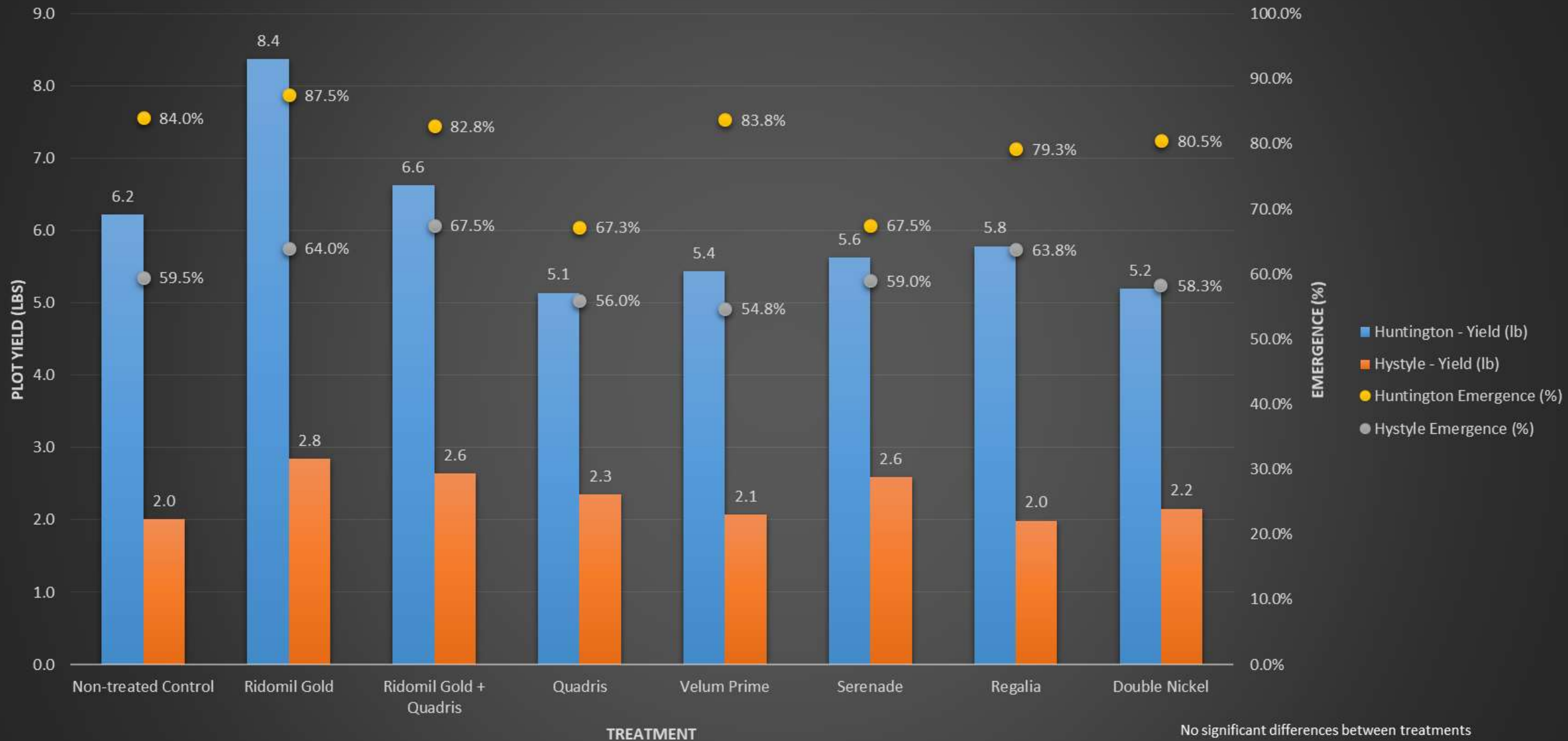
- Location: Hancock ARS 2018
- 2 Varieties: Huntington and Hystyle (no seed treatments)
- Planting Date: 2 July
- Fungicides applied: drench in-row over the top of covered seed
- Data collected: emergence, plant vigor, foliar and root symptoms, and yield
- Harvested: 10 September

Treatment Number				
Huntington	Hystyle	Treatment	rate/1000 rf	Application Timing <sup>z</sup>
1	9	Non-treated Control		NA
2	10	Ridomil Gold	mefenoxam	
3	11	Ridomil Gold + Quadris	mefenoxam + azoxystrobin	
4	12	Quadris	azoxystrobin	
5	13	Velum Prime	fluopyram	
6	14	Serenade	<i>Bacillus subtilis</i>	
7	15	Regalia	Extract of <i>Reynoutria sachalinensis</i>	
8	16	Double Nickel	<i>Bacillus amyloliquefaciens</i>	



# Root Rot & Damping Off Diseases

## *In-row Treatment Study 2018*



# **Root Rot & Damping Off Diseases**

## ***In-row Treatment Study 2018***

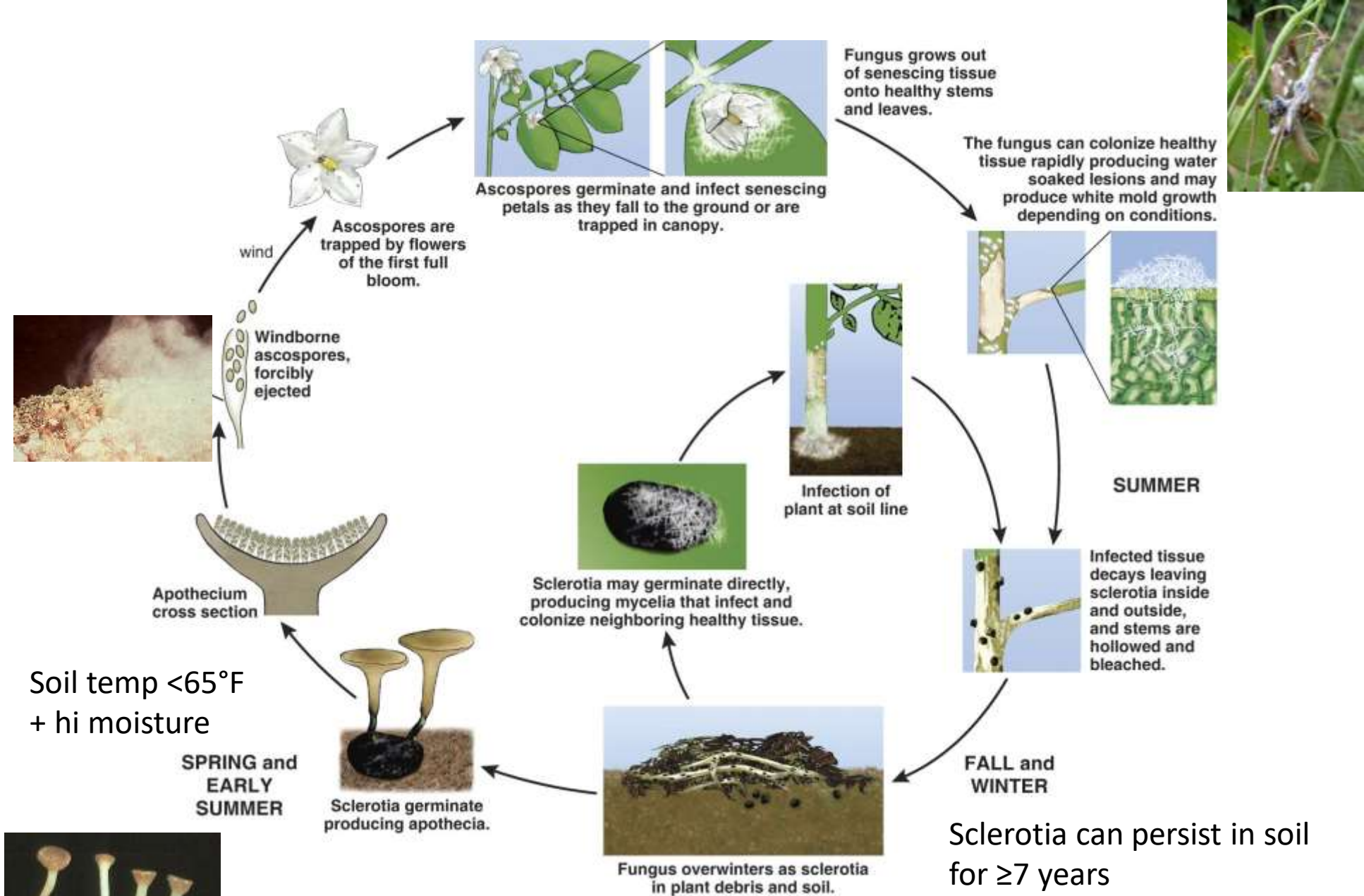
- No significant differences in emergence or yield when compared to non-treated control (data shown in graph on previous slide)
- No significant differences in plant vigor or disease when compared to non-treated control (data not shown)
- Relatively low disease pressure
- No phytotoxicity observed for any treatments



# White Mold on Snap Beans in 2018



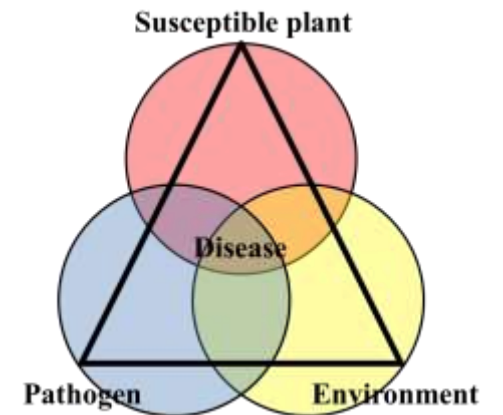
- A favorable year for white mold in bean crops in some locations depending upon rainfall and crop status
- Pathogen continues to be present in many/more fields
- In many cases, by the time symptoms/signs were evident, it was too late for fungicides to be effective



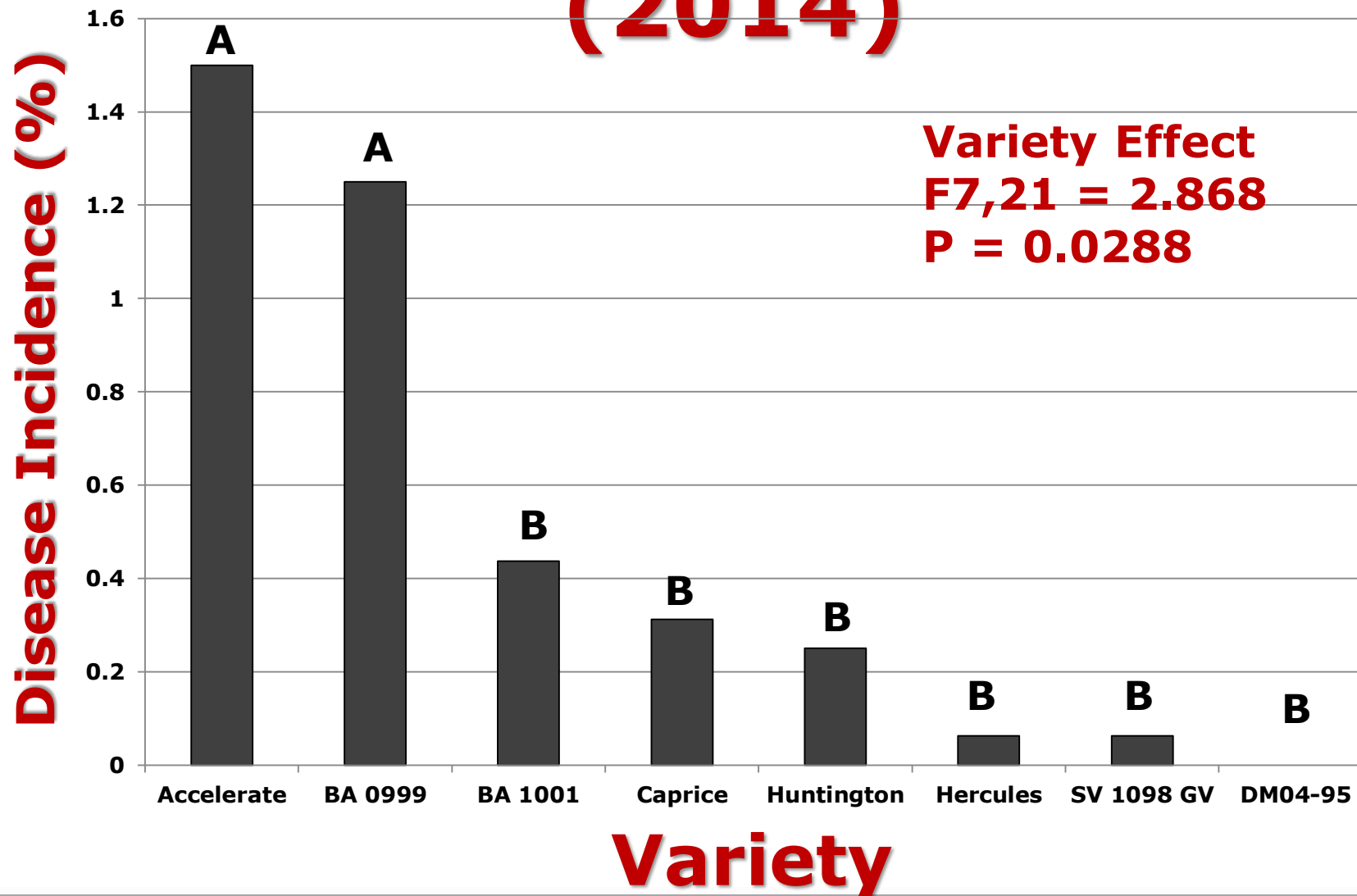
# White Mold Disease Cycle

# White Mold Management Strategies

- Track history of white mold pathogen in fields
- Monitor soil moisture (pathogen requires saturation to field capacity for 10 days to produce apothecia and ascospores)
- Initiate fungicide use just before peak bloom
- Follow cultural practices that promote drying of soil and plant (avoid narrow row spacing)
- Avoid small fields surrounded by dense woods that restrict air circulation
- Plant rows in direction of the prevailing winds
- Avoid highly susceptible and dense varieties
- Plow fields immediately after harvest and rotate crops to reduce inoculum



# White Mold Incidence (2014)





# **Snap Bean White Mold Fungicide Efficacy Evaluation**

## ***Research Objectives***

MWFPA funded project (2018-2020): Evaluating fungicides and their timing for control of white mold in irrigated snap beans

Document the effectiveness of fungicides and timing of their application to control white mold on snap bean in central Wisconsin.



# **Snap Bean White Mold Fungicide Evaluation 2018**

- Location: Delmonte Research Farm, Plover, Wisconsin
- 3 Varieties: DMF 04-88, Pismo, and Hystyle
- Planting Date: 4 July
- Application: Fungicides applied with a CO2 back pack sprayer at flowering (13 Aug) and 7 days later (20 Aug)
- Data Collected: white mold plant 'hits' and yield
- Harvest Date: 11 September

# Snap Bean White Mold Fungicide Evaluation 2018

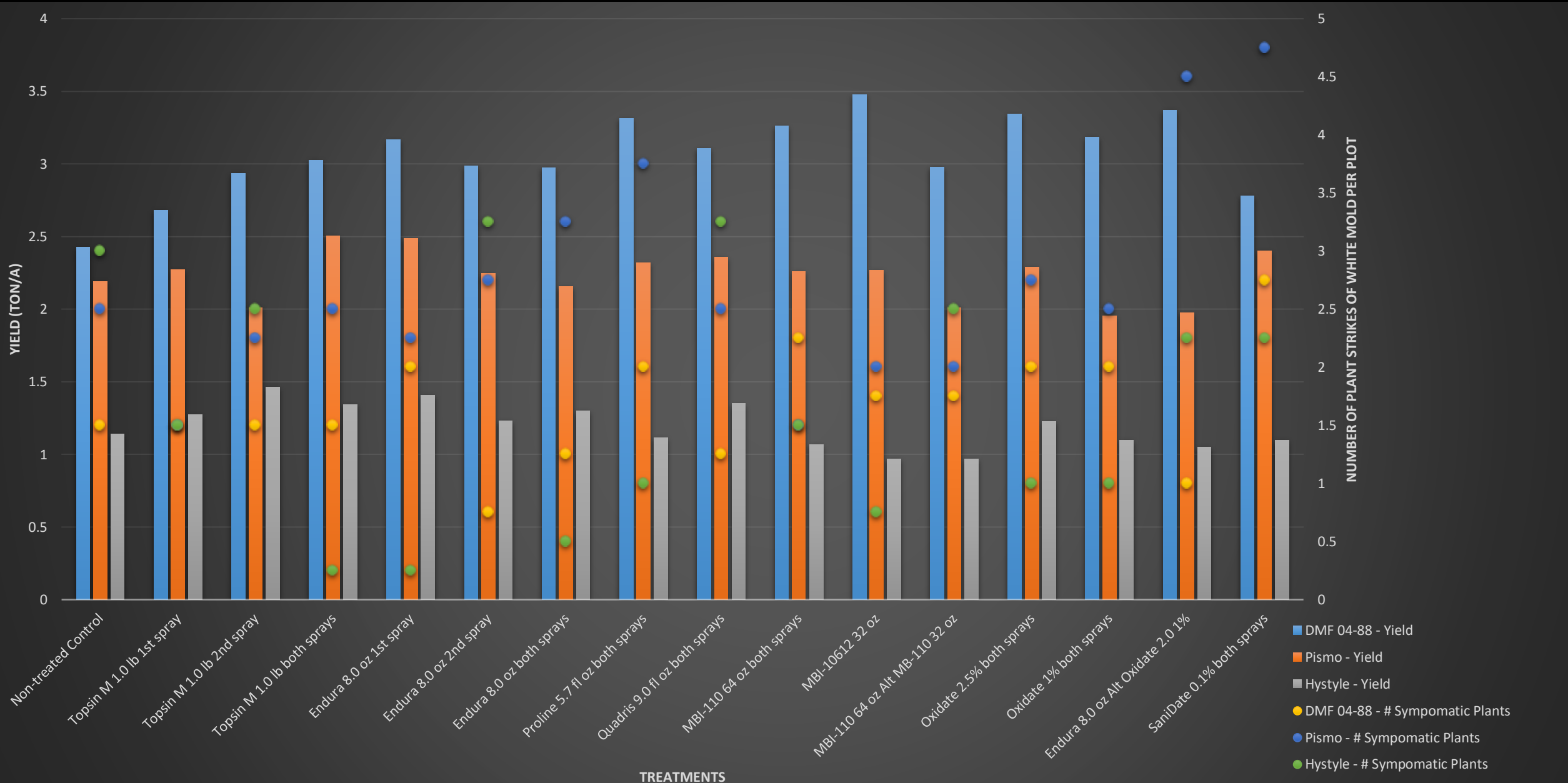
Trt #	Treatment and rate/acre	Application Timing <sup>z</sup>
1	Non-treated Control	NA
2	Topsin M 70WSB 1.0 lb	1
3	Topsin M 70WSB 1.0 lb	2
4	Topsin M 70WSB 1.0 lb	1,2
5	Endura 70WDG 8.0 oz + 0.1%v/v NIS	1
6	Endura 70WDG 8.0 oz + 0.1%v/v NIS	2
7	Endura 70WDG 8.0 oz + 0.1%v/v NIS	1,2
8	Proline 480SC 5.7 fl oz	1,2
9	Quadris 2.08SC 9.0 fl oz	1,2
10	MBI-110 AF5 64 oz	1,2
11	MBI-10612 32 oz	1,2
12	MBI-110 AF5 64 oz	1
	MB-110 AF5 32 oz	2
13	Oximate 2.0 2.5% v/v + WetCit 0.25%	1,2
14	Oximate 2.0 1% v/v + WetCit	1,2
15	Endura 70WDG 8.0 oz + 0.1%v/v NIS	1
	Oximate 2.0 1% v/v + WetCit	2
16	SaniDate 12.0 0.1% v/v + WetCit	1,2



# Snap Bean White Mold Fungicide Evaluation 2018

Trt #	Treatment and rate/acre	Application Timing <sup>z</sup>
1	Non-treated Control	NA
2	Topsin M 70WSB 1.0 lb	thiophanate methyl
3	Topsin M 70WSB 1.0 lb	thiophanate methyl
4	Topsin M 70WSB 1.0 lb	thiophanate methyl
5	Endura 70WDG 8.0 oz + 0.1%v/v NIS	boscalid
6	Endura 70WDG 8.0 oz + 0.1%v/v NIS	boscalid
7	Endura 70WDG 8.0 oz + 0.1%v/v NIS	boscalid
8	Proline 480SC 5.7 fl oz	prothioconazole
9	Quadris 2.08SC 9.0 fl oz	azoxystrobin
10	MBI-110 AF5 64 oz	<i>Bacillus amyloliquefaciens</i>
11	MBI-10612 32 oz	<i>Reynoutria sachalinensis</i> extract
	MBI-110 AF5 64 oz	<i>Bacillus amyloliquefaciens</i>
12	MB-110 AF5 32 oz	
13	Oximate 2.0 2.5% v/v + WetCit 0.25%	hydrogen dioxide + PAA
14	Oximate 2.0 1% v/v + WetCit	hydrogen dioxide + PAA
	Endura 70WDG 8.0 oz + 0.1%v/v NIS	boscalid + hydrogen dioxide + PAA
15	Oximate 2.0 1% v/v + WetCit	
16	SaniDate 12.0 0.1% v/v + WetCit	hydrogen dioxide + PAA

# Snap Bean White Mold Fungicide Evaluation 2018



# **Snap Bean White Mold Fungicide Evaluation**

## ***2018 Results***

- **No significant differences in disease or yield among treatments by variety** (data shown on previous slide)
  - **DMF 04-88** highest yielding variety, lower disease, best white mold control with Endura, Quadris, Endura + OxiDate treatments
  - **Pismo** second highest yielding variety, higher disease, best white mold control with Topsin, Endura, and Marrone biopesticide treatments
  - **Hystyle** lowest yielding variety, low to moderate disease, best control with Topsin, Endura, Reynoutria, and Oxidate treatments
- Relatively low disease pressure and most infections occurred by ground contact, not through flowers
- No phytotoxicity observed for any treatments

# Currently registered fungicides for white mold control in snap/green beans

3336® EG Cleary Chemical LLC 1001-89	3336® F Cleary Chemical LLC 1001-69	3336® WP Cleary Chemical LLC 1001-63
Amplitude™ Marrone Bio Innovations 84059-28	Aviv™ STK bio-ag technologies 91473-1-86182	Blocker® 4F Amvac Chemical Corporation 5481-8992
Cercobin® Fungicide FMC Corporation 8033-129-279	Cuéva® Fungicide Concentrate Certis USA, L.L.C. 67702-2-70051	Double Nickel 55™ Certis USA, L.L.C. 70051-108
Double Nickel™ LC Certis USA, L.L.C. 70051-107	Endura® fungicide BASF 7969-197	Ethos® XB Insecticide/Fungicide FMC Corporation 279-3473
Fontelis® DUPONT 352-834	Incognito® 4.5 F ADAMA 66222-134	Iprodione 4L AG Arysta U.S.A. 66330-207
Kenja® 400SC Fungicide Summit Agri USA, LLC 71512-22-88783	LifeGard™ WG Certis USA, L.L.C. 70051-119	Meteor™ Fungicide United Phosphorus Inc. 70506-243
Nevado® 4F ADAMA 66222-144	Nufarm T-Methyl 4.5 F Fungicide Nufarm Agricultural Products 228-652	Nufarm T-Methyl 70 WSB Fungicide Nufarm Agricultural Products 228-655
Omega® 500F Syngenta Crop Protection, LLC, 71512-1-100	OSO™ 5%SC Fungicide Certis USA, L.L.C. 68173-4-70051	OxiDate® 2.0 BioSafe Systems, LLC 70299-12
Prev-Am® Ultra ORD Agri, Inc. 72662-3	Priaxor® Xenium® brand fungicide BASF 7969-311	Regalia® Marrone Bio Innovations 84059-3
Regalia® CG Marrone Bio Innovations 84059-3	Rendition™ Certis USA, L.L.C. 68660-14-70051	Rovral® 4 Flowable Fungicide FMC Corporation 279-9564
SaniDate® 12.0 BioSafe Systems, LLC 70299-18	Serenade® A50 Bayer CropScience 264-1152	Serenade® Opti Bayer CropScience 264-1160
Stargus™ Marrone Bio Innovations 84059-28	Switch® 62.5WG Syngenta Crop Protection, LLC. 100-953	Topsin® 4.5FL Fungicide United Phosphorus Inc. 8033-122-70506
Topsin® M WSB Fungicide United Phosphorus Inc. 8033-125-70506	Trevi™ Packed Innovative Crop Care, LLC 89168-38-88391	Vacciplant® Arysta U.S.A. 83941-2-66330

# Currently registered fungicides for white mold control in snap/green beans

thiophan methyl 1

*Bacillus amylo.*

thiophan methyl 1

*Bacillus amylo.*

penthiopyrad 7

isofetamid 7

iprodione 2

fluazinam 29

Sodium tetra deca

*Reynoutria sach.*

*Hydro diox+PAA*

*Bacillus amylo.*

thiophan methyl 1

thiophan methyl 1

*Bacillus subtilis*

copper octanoate

boscalid 7

thiophan methyl 1

*Bacillus mycoides*

thiophan methyl 1

Polyox D Zn salt 19

fluxa7 + pyraclo11

*Hydro perox+PAA*

*Bacillus subtilis*

fludiox 9+cyprod 12

tebu3+thiophan1+  
azoxy 11

thiophan methyl 1

PCNB

*Bacillus amylo.*

*Bacillus amylo.*

iprodione 2

iprodione 2

thiophan methyl 1

*Hydro diox+PAA*

*Reynoutria sach.*

iprodione 2

*Bacillus subtilis*

thiophan methyl 1

laminarin P4

# SDHIs – FRAC Group 7

C. respiration	C2 complex II: succinate-dehydro- genase	SDHI (Succinate- dehydrogenase inhibitors)	phenyl-benzamides	benodanil flutolanil mepronil	Resistance known for several fungal species in field populations and lab mutants. Target site mutations in sdh gene, e.g. H/Y (or H/L) at 257, 267, 272 or P225L, dependent on fungal species. Resistance management required.  Medium to high risk.  See FRAC SDHI Guidelines for resistance management.	7
			phenyl-oxo-ethyl thiophene amide	isofetamid		
			pyridinyl-ethyl- benzamides	fluopyram		
			furan- carboxamides	fenfuram		
			oxathiin- carboxamides	carboxin oxycarboxin		
			thiazole- carboxamides	thifluzamide		
			pyrazole-4- carboxamides	benzovindiflupyr bixafen fluidinapyr fluxapyroxad furametpyr inpyrfluxam isopyrazam penflufen penthiopyrad sedaxane		
			N-cyclopropyl-N- benzyl-pyrazole- carboxamides	isoflucypram		
			N-methoxy-(phenyl- ethyl)-pyrazole- carboxamides	pydiflumetofen		
			pyridine- carboxamides	boscalid		
			pyrazine- carboxamides	pyraziflumid		

No cross resistance between fluopyram and boscalid

thiophan methyl 1	thiophan methyl 1	thiophan methyl 1
<i>Bacillus amylo.</i>	<i>Bacillus subtilis</i>	PCNB
thiophan methyl 1	copper octanoate	<i>Bacillus amylo.</i>
<i>Bacillus amylo.</i>	boscalid 7	<i>Bacillus amylo.</i>
penthiopyrad 7	thiophan methyl 1	iprodione 2
isofetamid 7	<i>Bacillus mycoides</i>	iprodione 2
iprodione 2	thiophan methyl 1	thiophan methyl 1
fluazinam 29	Polyox D Zn salt 19	<i>Hydro diox+PAA</i>
Sodium tetra deca	fluxa7 + pyraclo11	<i>Reynoutria sach.</i>
<i>Reynoutria sach.</i>	<i>Hydro perox+PAA</i>	iprodione 2
<i>Hydro diox+PAA</i>	<i>Bacillus subtilis</i>	<i>Bacillus subtilis</i>
<i>Bacillus amylo.</i>	fludiox 9+cyprod 12	thiophan methyl 1
thiophan methyl 1	tebu3+thiophan1+ azoxy 11	laminarin P4



# Newly registered

TREVO™

PACKED

GROUP

1

3

11

FUNGICIDE

FUNGICIDE

ACTIVE INGREDIENTS:

Thiophanate-methyl (dimethyl (1,2-phenylene)-bis(iminocarbonothioyl)bis(carbamate))\*

35.87%

Tebuconazole, alpha-[2-(4-chlorophenyl)ethyl]-alpha-(1,1-dimethylethyl)-1H-1,2,4-triazole-1-ethanol

7.08%

Azoxystrobin; methyl (E)-2-[2-[6-(2-cyanophenoxyl)pyrimidin-4-yl]oxy]phenyl-3-methoxyacrylate

6.19%

OTHER INGREDIENTS:

50.86%

TOTAL:

100.00%

\* Also known as dimethyl 4,4'-o-phenylenebis[3-thioallophanate]

Contains 3.6 pounds thiophanate-methyl per gallon.

Contains 0.7 pounds tebuconazole per gallon.

Contains 0.6 pounds azoxystrobin per gallon.

KEEP OUT OF REACH OF CHILDREN

CAUTION

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.  
(If you DO NOT understand the label, find someone to explain it to you in detail.)

EPA Reg. No.: 89168-38-89391

Distributed By:

INNOVATIVE CROP CARE, LLC™

4850 Hobbs Peak Drive, Suite 200

Lowland, CO 80538

thiophan methyl 1	thiophan methyl 1	thiophan methyl 1
Bacillus amylo.	Bacillus subtilis	PCNB
thiophan methyl 1	copper octanoate	Bacillus amylo.
Bacillus amylo.	boscalid 7	Bacillus amylo.
penthiopyrad 7	thiophan methyl 1	iprodione 2
isofetamid 7	Bacillus mycoides	iprodione 2
iprodione 2	thiophan methyl 1	thiophan methyl 1
fluazinam 29	Polyox D Zn salt 19	Hydro diox+PAA
Sodium tetra deca	fluxa7 + pyraclo11	Reynoutria sach.
Reynoutria sach.	Hydro perox+PAA	iprodione 2
Hydro diox+PAA	Bacillus subtilis	Bacillus subtilis
Bacillus amylo.	fludiox 9+cyprod 12	thiophan methyl 1
thiophan methyl 1	tebu3+thiophan1+ azoxy 11	laminarin P4



Newly registered

TREVO

ACTIVE INGREDIENTS:  
Thiophanate-methyl (dimethyl [1,2-phe  
bis[ carbamate]]\*)  
Tebuconazole, alpha-[2-(4-chlorophenyl  
2,4-triazole-1-ethanol  
Azoxystrobin; methyl (E)-2-[2-[6-(2-cyan  
phenyl)-3-methoxyacrylate  
OTHER INGREDIENTS:  
TOTAL:  
\* Also known as dimethyl 4,4'-o-phenyl  
Contains 3.6 pounds thiophanate-methy  
Contains 0.7 pounds tebuconazole per g  
Contains 0.6 pounds azoxystrobin per g

KEEP OUT

Si usted no entiende la etiqueta,  
(If you DO NOT understand)

EPA Reg. No.: 89168-38-89391



CROP	DISEASES	RATE FL. OZ TREVO PACKED / ACRE	REMARKS
Beans, (Fresh and dry except succulent shelled)  DO NOT enter or allow worker entry into treated areas during the restricted-entry-interval (REI) of 24 hours for fresh beans and 3 days for dry beans	Gray Mold (Botrytis spp.) Anthracnose (Colletotrichum spp.) Rust (Uromyces appendiculatus)	25-30	Beans, fresh: DO NOT exceed a total application of 2.8 lbs. a.i. thiophanate-methyl, 0.68 lb. a.i. tebuconazole and 1.5 lbs. a.i. azoxystrobin per acre per year from all applications of all products containing these active ingredients.  Beans, fresh: Pre-harvest interval (PHI): 14 days In California the Pre-harvest interval (PHI) for lima beans is 28 days.  Beans, dry: DO NOT exceed a total application of 2.8 lbs. a.i. thiophanate-methyl and 0.34 lb. a.i. tebuconazole per acre per year from all applications of all products containing these active ingredients.  Beans dry: Pre-harvest interval (PHI): 28 days  DO NOT graze or feed treated plants or hay to livestock.  Closely observe bean fields for early disease symptoms especially when conditions favor disease development. Apply TREVO PACKED as a preventative spray for best results. Make a second application 14 days later if needed.

4

CROP	DISEASES	RATE FL. OZ TREVO PACKED / ACRE	REMARKS
Beans cont'd	White Mold (Sclerotinia sclerotiorum)	30	Bean fields should be observed closely for early disease symptoms especially when conditions favor disease development. Apply TREVO PACKED as a preventative spray for best results  Apply when 10% to 30% of plants have at least one open bloom and prior to the development of disease for best results. Follow with an application of another white mold fungicide (excluding products containing a triazole Group 3 Fungicide active ingredient) 4 to 7 days later. If a third application is required, TREVO PACKED can be applied again 14 days after the first TREVO PACKED application.

thiophan methyl 1

Bacillus amylo.

thiophan methyl 1

Bacillus subtilis

thiophan methyl 1

PCNB

Bacillus amylo.

Bacillus amylo.

iprodione 2

iprodione 2

thiophan methyl 1

Hydro diox+PAA

Reynoutria sach.

iprodione 2

Bacillus subtilis

thiophan methyl 1

laminarin P4

Bacillus amylo.

thiophan methyl 1

fludiox 9+cyprod 12

tebu3+thiophan1+  
azoxy 11

# **Snap Bean White Mold Control with Fungicides – Summary over past decade of research**

Thiophanate methyl, boscalid, and iprodione at 30% flower and 7 days later provided good-excellent control of white mold under low and moderate disease pressure

Strobilurins (Approach, Quadris) at 30% flower and 7 days later provided outstanding white mold control and high yields in WI and NY under low and moderate disease pressure –

***labeled now for snap bean white mold control in component of Trevo Packed***

Newer Fontelis (penthioopyrad) and Priaxor (fluxapyroxad+pyraclostrobin) provided excellent control of white mold under low disease pressure

Biopesticides (Regalia, MBI110 reg in 2017) can have a place in the program when alternated with an effective fungicide such as Topsin

# Acknowledgements

- Midwest Food Processors Association
- Agrichemical industry partners
- USDA – IPM pipe
- Wisconsin Potato & Vegetable Growers Association

Don Caine, DelMonte, Plover, WI

University of Wisconsin Vegetable Disease  
Website (newsletter access)

<http://www.plantpath.wisc.edu/wivegdis/>



Dr. Steve Jordan  
Alyssa Geske  
John Hammel  
Sam Meyer

Plant Pathology  
at the University of Wisconsin - Madison



THE UNIVERSITY  
of  
**WISCONSIN**  
MADISON

**UW**  
**Extension**

Learning for life

# Snap Bean White Mold Fungicide Efficacy Trial 2016

## DelMonte, Plover, Wisconsin

### Number of White Mold Symptomatic Plants per Plot

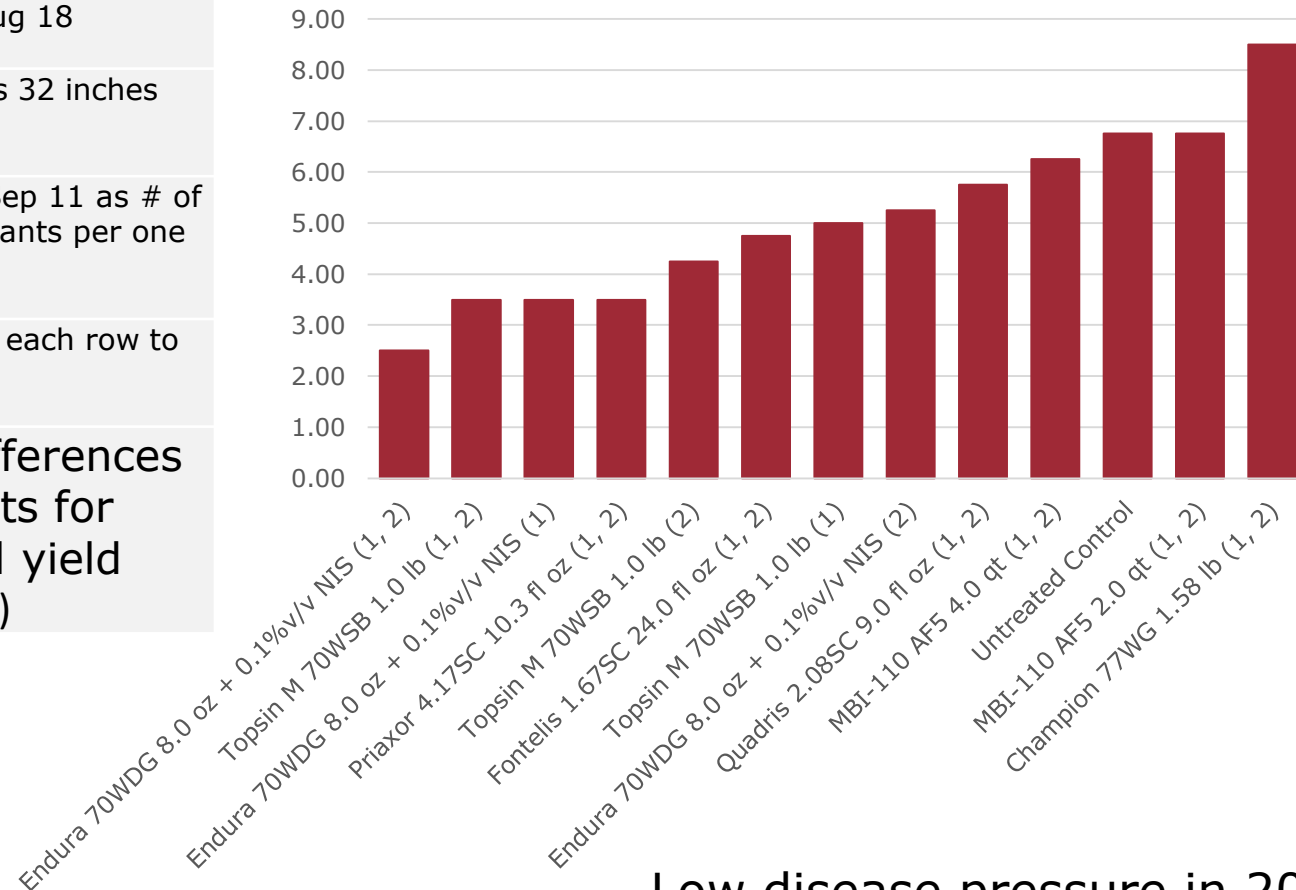
1<sup>st</sup> Fungicide Application (1): Aug 11  
2<sup>nd</sup> Application (2): Aug 18

plots consisted of 2 rows 32 inches apart, 40 ft long

disease was evaluated Sep 11 as # of "hits" or symptomatic plants per one 40 ft row

5 ft was harvested from each row to assess yield on Sep 11

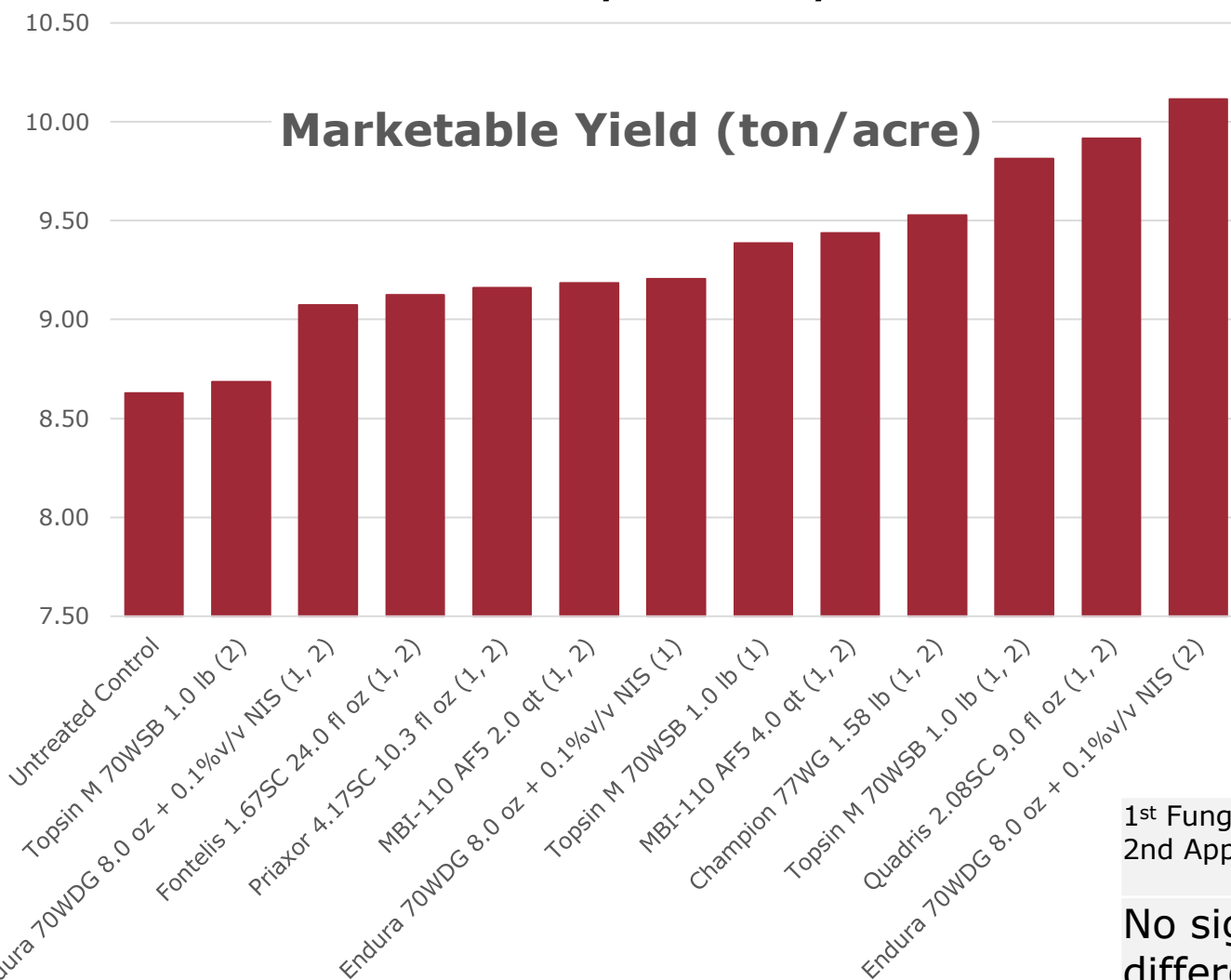
No significant differences among treatments for both disease and yield (Fisher's LSD,  $P=0.05$ )



Low disease pressure in 2016

# Snap Bean White Mold Fungicide Efficacy Trial 2016

## DelMonte, Plover, Wisconsin

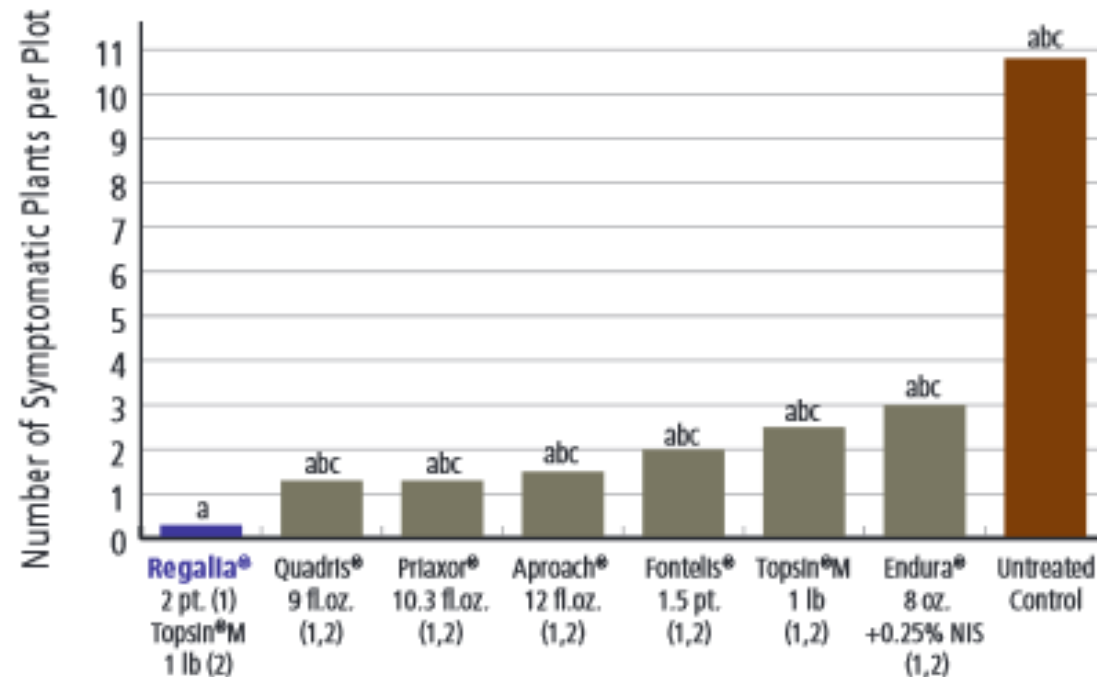


Low disease pressure in 2016  
High yield didn't correlate with low disease

1<sup>st</sup> Fungicide Application: Aug 11  
2<sup>nd</sup> Application: Aug 18

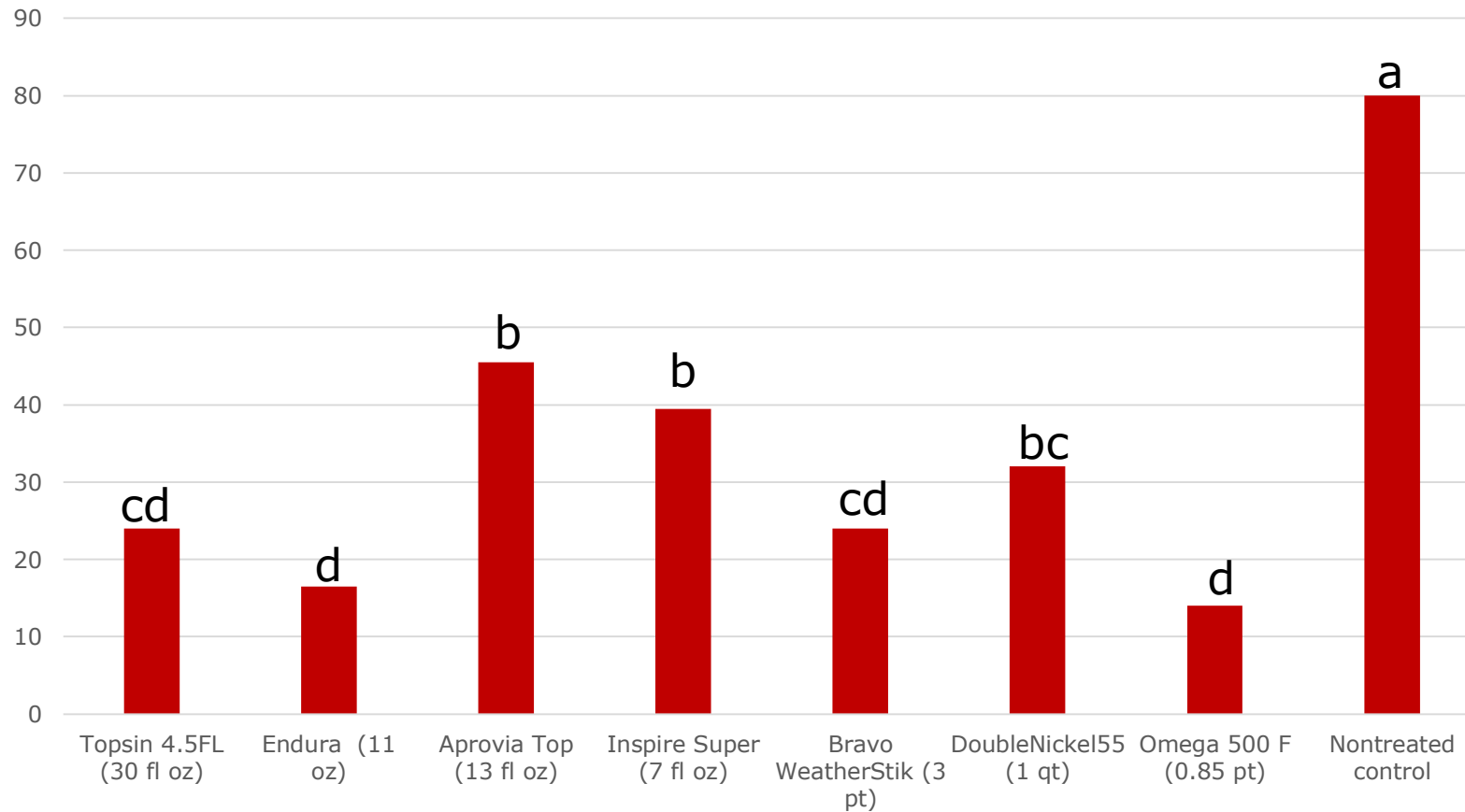
No significant  
differences among  
treatments for both  
disease and yield  
(Fisher's LSD,  $P=0.05$ )

## Snap Bean White Mold Fungicide Efficacy Trial 2013 UW-Hancock ARS, Wisconsin



Foliar applications were applied at either the 30% bloom stage on 26 June (1) and/or at 100% flowering (7 days after 30% bloom) on 3 July (2).  
Column numbers followed by the same letter are not significantly different at  $P=0.05$  as determined by Fisher's Least Significant Difference (LSD) test.  
Evaluated at harvest on 19 July, 2013

## White Mold Incidence 'Huntington', Canandaigua, NY, 2015



S. Pethybridge, PDMR, 2016



# White Mold Incidence and Yield DelMonte 88-04 Hancock, WI, 2015

Product and rate/acre	Application Timing <sup>z</sup>	Number of Symptomatic Plants	Marketable Yield (ton/A)
Untreated control		9.8	3.8
Endura 70WDG 8.0 oz + 0.1% v/v NIS	1,2	5.5	4.4
Topsin M 70WSB 1.0 lb	1,2	4.8	4.4
Topsin M 70WSB 1.0 lb	2	8.3	3.1
Fontelis 1.67SC 24.0 fl oz	1,2	11.8	4.3
Quadris 2.08SC 9.0 fl oz	1,2	15.3	4.0
Priaxor 4.17SC 10.3 fl oz	1,2	10.3	3.8
Endura 70WDG 8.0 oz + 0.1% v/v NIS	1	11.0	3.7
Endura 70WDG 8.0 oz + 0.1% v/v NIS	2	7.8	3.8
Topsin M 70WSB 1.0 lb	1	10.0	4.0
Champion 77WG 1.58 lb	1,2	7.3	3.9
Champion 77WG 1.58 lb	1		
EF400 8.0 fl oz + Bacstop 6.0 fl oz	2	8.0	3.7
EF400 8.0 fl oz + Bacstop 6.0 fl oz	1,2	11.0	3.7
EF400 8.0 fl oz + Bacstop 6.0 fl oz	1		
Champion 77WG 1.58 lb	2	13.5	3.3

Foliar applications were applied at either the 30% bloom stage on 15 Jul (1) and/or at 100% flowering (7 days after 30% bloom) on 22 Jul (2).

No significant difference in disease or yield in this trial.

# Fungicide Programs Evaluated

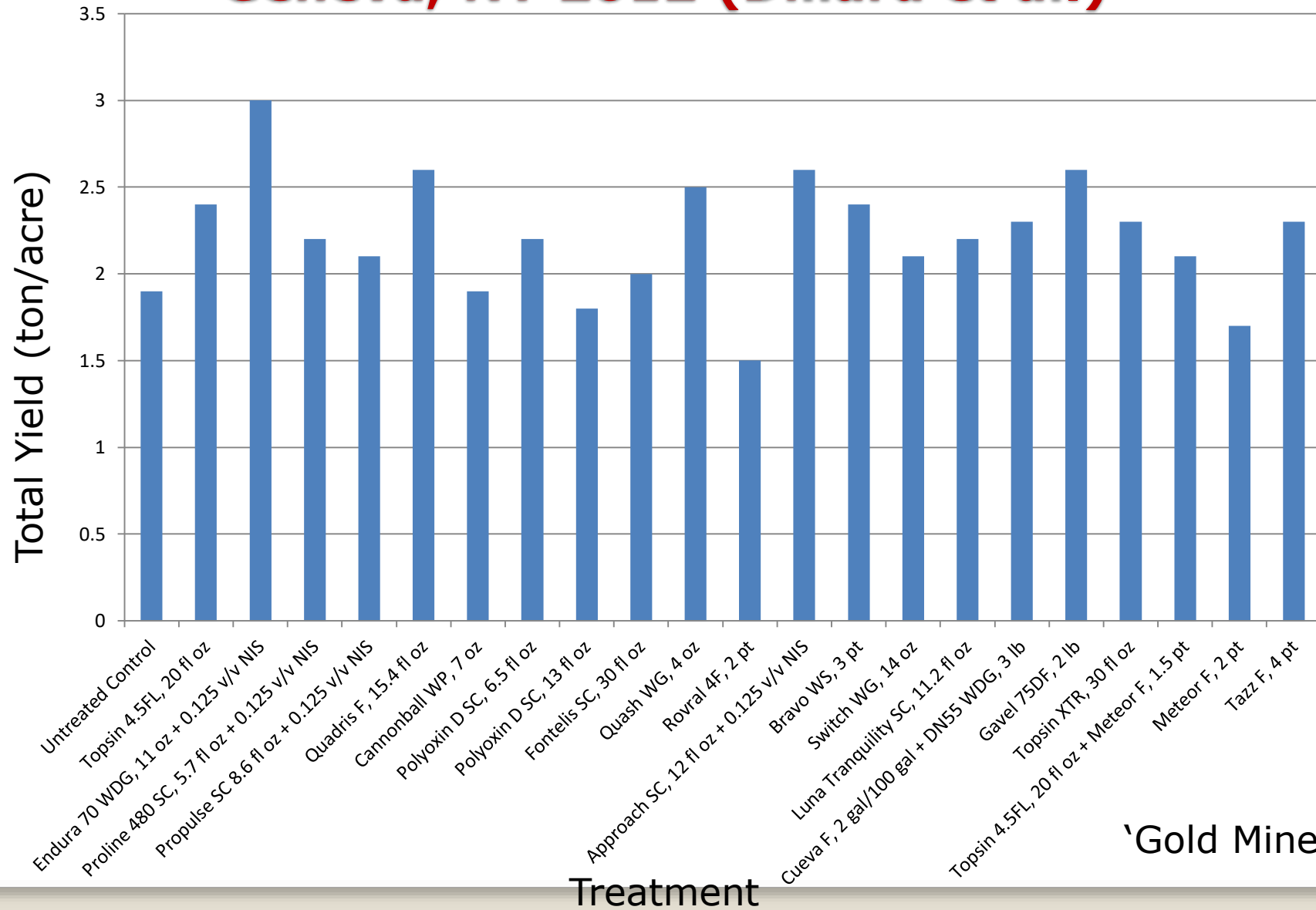
## Geneva, NY 2012, moderate white mold pressure

Blue indicates not currently registered

Trt #	Fungicide,rate	Active Ingredient	Timing of Application
<b>1</b>	Untreated Control	NA	NA
<b>2</b>	Topsin 4.5FL, 20 fl oz	thiophanate methyl	30% bloom + 7 days later
<b>3</b>	Endura 70 WDG, 11 oz + 0.125 v/v NIS	boscalid	30% bloom + 7 days later
<b>4</b>	Proline 480 SC, 5.7 fl oz + 0.125 v/v NIS	prothioconazole	30% bloom + 7 days later
<b>5</b>	Propulse SC 8.6 fl oz + 0.125 v/v NIS	prothio+fluopyram	30% bloom + 7 days later
<b>6</b>	Quadris F, 15.4 fl oz	azoxystrobin	30% bloom + 7 days later
<b>7</b>	Cannonball WP, 7 oz	fludioxonil	30% bloom + 7 days later
<b>8</b>	Polyoxin D SC, 6.5 fl oz	Zn salts	30% bloom + 7 days later
<b>9</b>	Polyoxin D SC, 13 fl oz	Zn salts	30% bloom + 7 days later
<b>10</b>	Fontelis SC, 30 fl oz	penthiopyrad	30% bloom + 7 days later
<b>11</b>	Quash WG, 4 oz	metconazole	30% bloom + 7 days later
<b>12</b>	Rovral 4F, 2 pt	iprodione	30% bloom + 7 days later
<b>13</b>	Approach SC, 12 fl oz + 0.125 v/v NIS	picoxystrobin	30% bloom + 7 days later
<b>14</b>	Bravo WS, 3 pt	chlorothalonil	30% bloom + 7 days later
<b>15</b>	Switch WG, 14 oz	cyprodinil+fludiox	30% bloom + 7 days later
<b>16</b>	Luna Tranquility SC, 11.2 fl oz	fluopyram+pyrimethanil	30% bloom + 7 days later
<b>17</b>	Cueva F, 2 gal/100 gal + DN55 WDG, 3 lb	copper	30% bloom + 7 days later
<b>18</b>	Gavel 75DF, 2 lb	zoxamide+mancozeb	30% bloom + 7 days later
<b>19</b>	Topsin XTR, 30 fl oz	thiophanate methyl	30% bloom + 7 days later
<b>20</b>	Topsin 4.5FL, 20 fl oz + Meteor F, 1.5 pt	thiophanate methyl+iprodione	30% bloom + 7 days later
<b>21</b>	Meteor F, 2 pt	iprodione	30% bloom + 7 days later
<b>22</b>	Tazz F, 4 pt	iprodione	

# Results – Total Yield & Disease

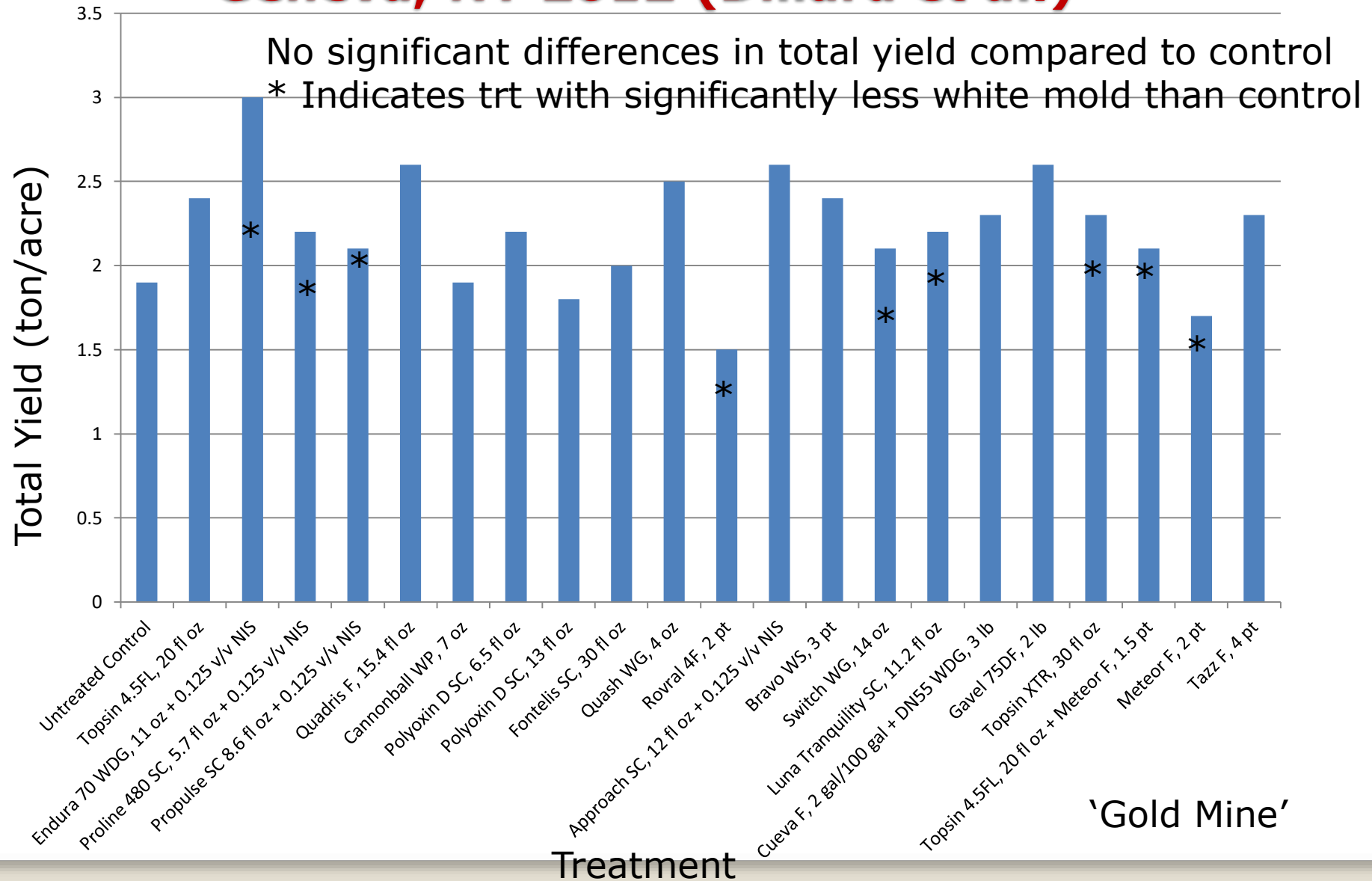
## Geneva, NY 2012 (Dillard et al.)



'Gold Mine'

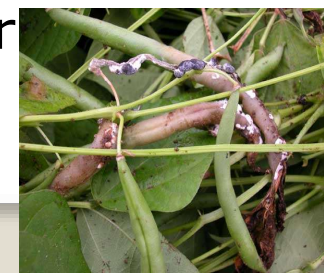
# Results – Total Yield & Disease

## Geneva, NY 2012 (Dillard et al.)



# Snap Bean White Mold Fungicides

- boscalid (**Endura**) – FRAC 7 - 7 day phi – 2 apps max
- thiophanate methyl (**Topsin**, Topsin M, T-methyl, Thiophanate methyl, Incognito) – 14 day phi – 2.8 lb a.i./A/season max
- cyprodinil & fludioxonil (**Switch**) – FRAC 9+12 - 7 day phi – do not apply more than 1.3 lb a.i./A/season
- *Bacillus subtilis* (**Serenade**) - biological
- iprodione (**Rovral**, Meteor, Nevado, Iprodione) – FRAC 2 - 2 app max/season – livestock feeding/foraging restrictions
- fluazinam (**Omega**) – FRAC 29 - do not apply more than 1.75 pt/A/season – 14 day phi
- *Coniothyrium minitans* (**Contans**, **Intercept**) – biological, soil incorporant prior to planting or after harvest



# Snap Bean White Mold Fungicides

## *Recent Registrations*

- penthiopyrad (**Fontelis**) - FRAC 7 – 0 day PHI – 72 fl oz/acre/ season label use limit
- fluxapyroxad+pyraclostrobin (**Priaxor**) – FRAC 7+11 – 7 day PHI – no more than 16 fl oz/acre/season
- fludioxonil (**Cannonball WP**) – FRAC 12– 7 day PHI – do not apply more than 28 oz/acre/season
- polyoxin D Zinc salt (**OSO 5% SC**) – FRAC 19 – do not make more than 6 applications/season at max rate
- extract of giant knotweed (*Reynoutria sachalinensis*) (**Regalia**) – FRAC P – biofungicide – OMRI certified – do not apply when plants are under stress
- *Bacillus amyloliquefaciens* strain D747 (**Double Nickel**) – biological, can be applied at planting, cultivation, 10-14 day intervals, 4 hour re-entry interval