

WHITE MOLD MANAGEMENT IN 2013: WAS IT PRODUCT OR TIMING?

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Drawing: Marilyn Hovius

Soilborne sclerotia

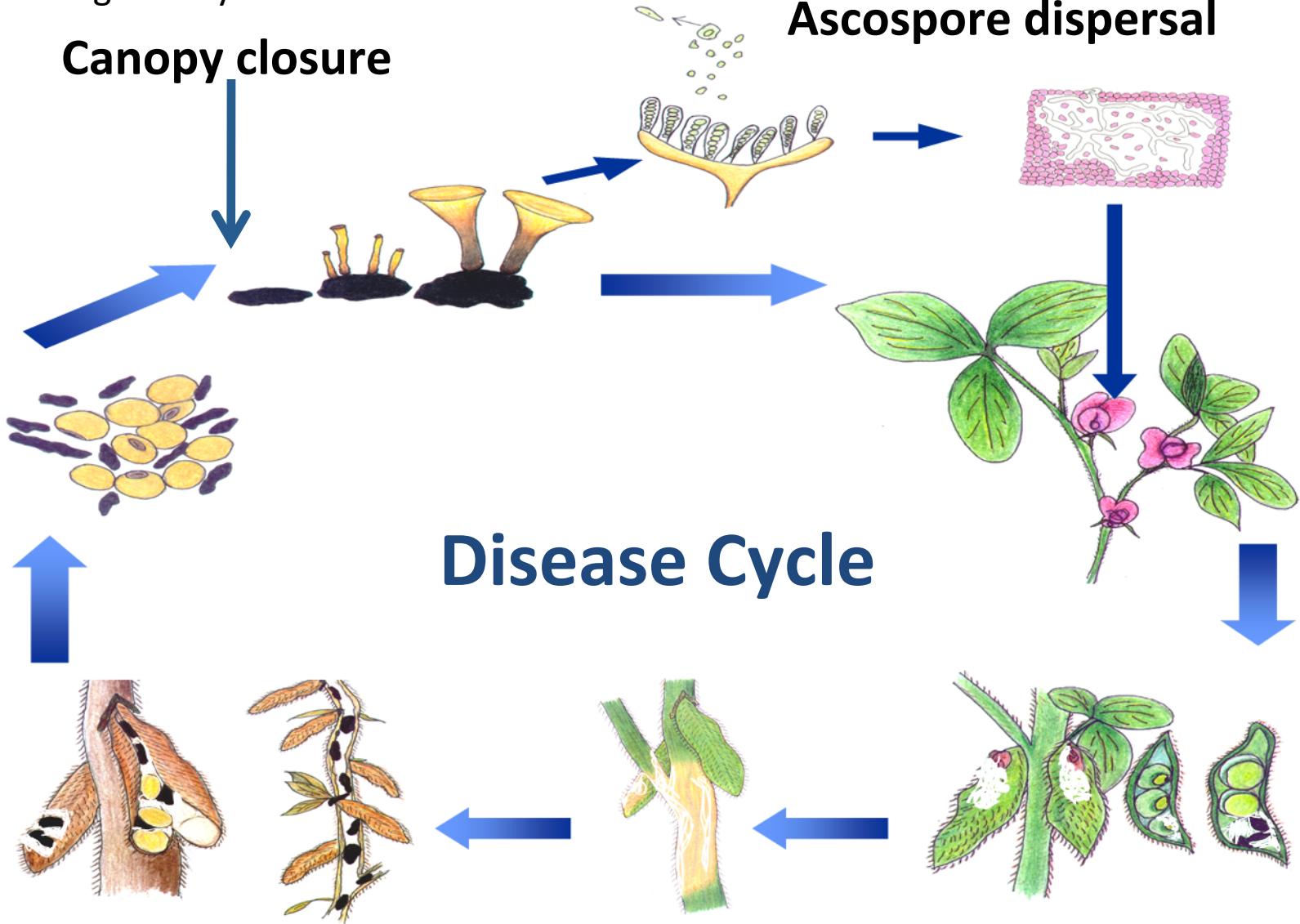
Canopy closure

Ascospore dispersal

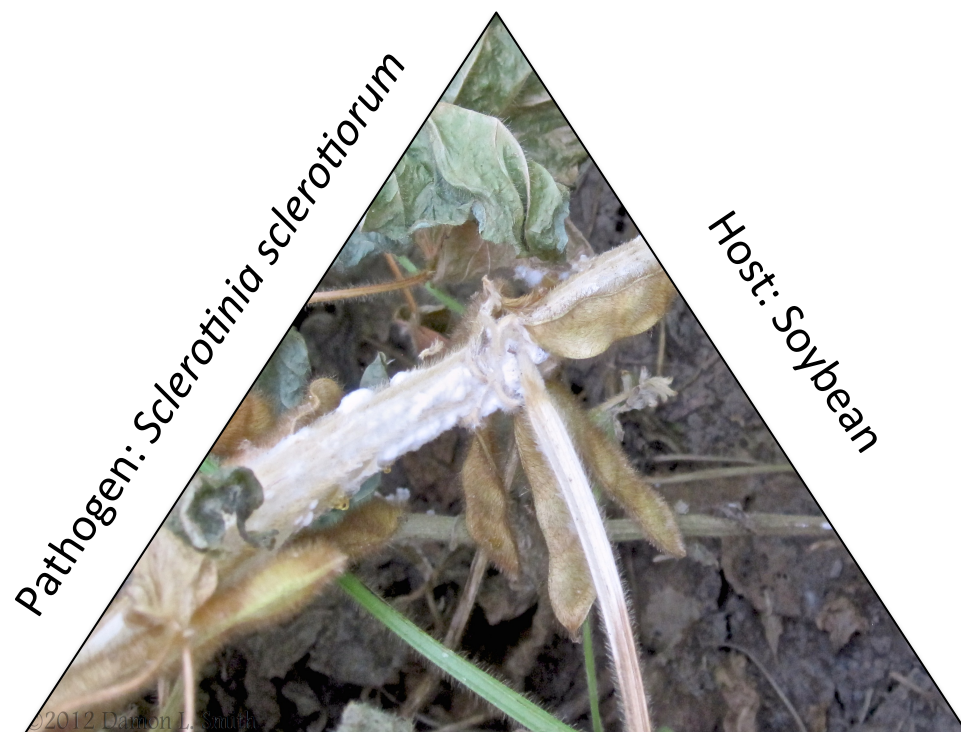
Disease Cycle

Disease and sclerotia development occur from
R3 to R8 growth stages

Slide Courtesy of Craig Grau



WHITE MOLD



2013 Field season

- Worse in soybeans planted later (e.g. early June)
- Earlier planted soybeans flowered during hot dry weather and escaped



YIELD LOSS AND MANAGEMENT

- For every 1% increment of plant mortality @ R6-7, yield loss is 0.25 to 0.50 bu/A
- Management is a function of:
 - Field history
 - Variety selection
 - Canopy row width and plant population
 - Crop rotation
 - Chemical and/or biological control



FUNGICIDE MODE OF ACTION

Mode of Action – defines how the product actually affects the fungus

Separate from fungicide mobility – how the fungicide moves in plants

Examples

Demethylation inhibitor (DMI) or FRAC 3 compounds – inhibits a specific enzyme in fungi that is important in sterol production

- Sterols are necessary in fungal cell membranes
- Lack of Sterols result in abnormal fungal growth

Quinone outside inhibitors (QoI) or FRAC 11 (Strobilurins) – inhibit mitochondrial respiration, stopping energy production, and resulting in fungal death

- Effective on germinating spores and early fungal growth only

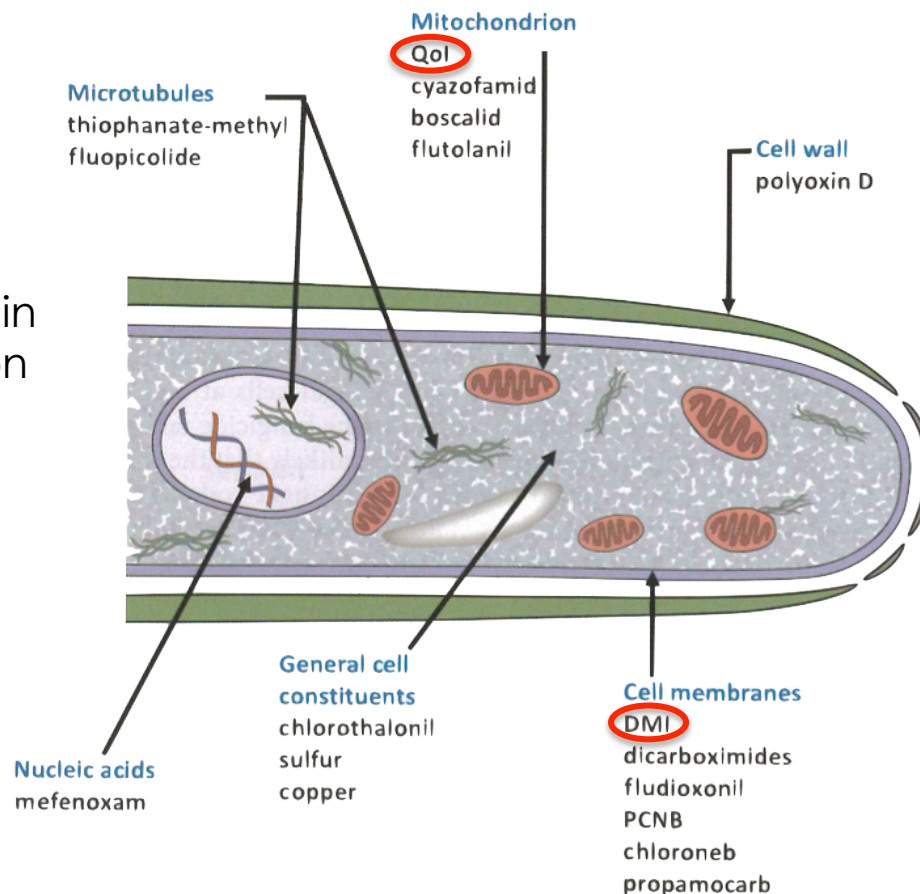


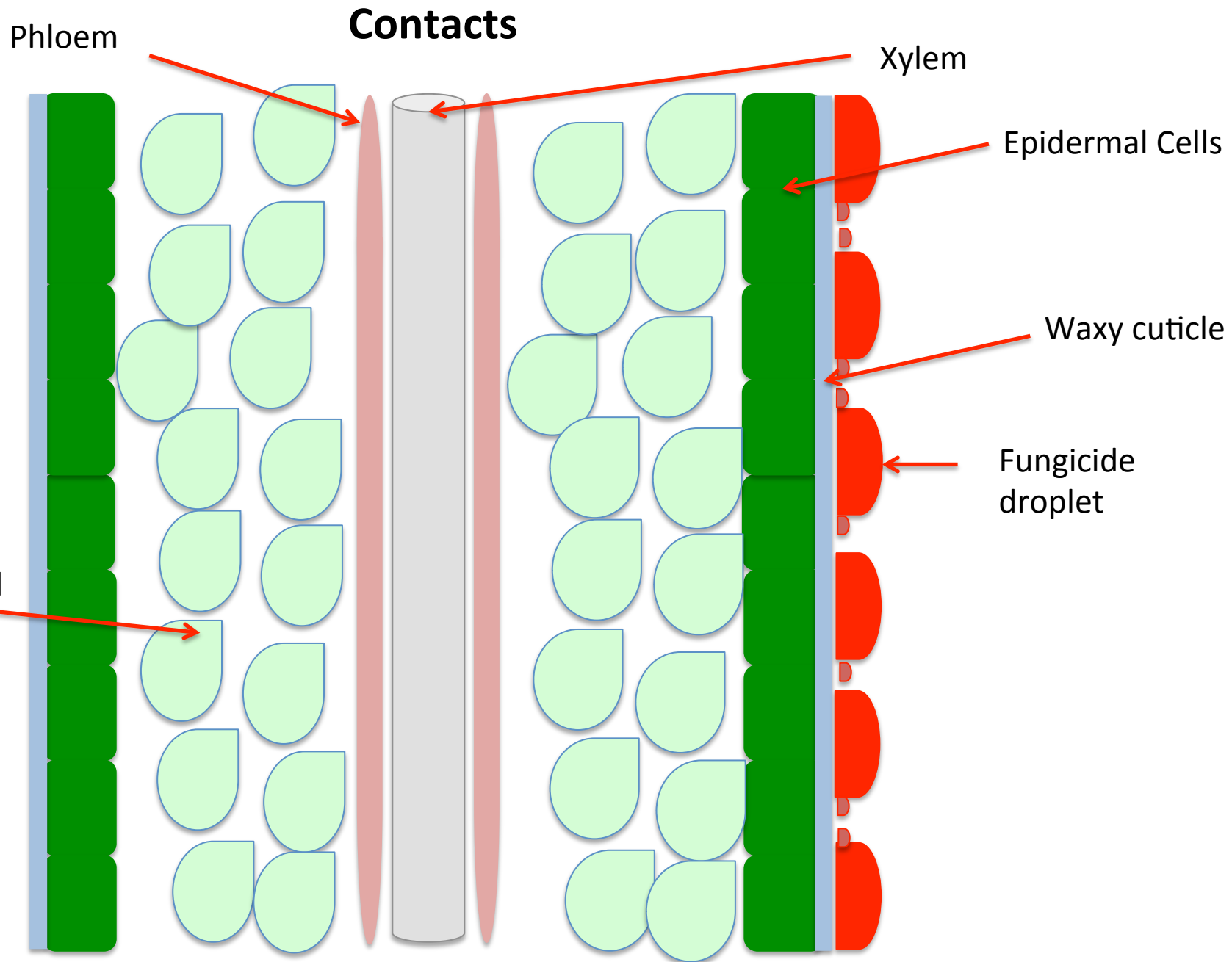
Image Credit: Fig. 2.4 from "A Practical Guide to Turfgrass Fungicides" by Richard Latin, Purdue University



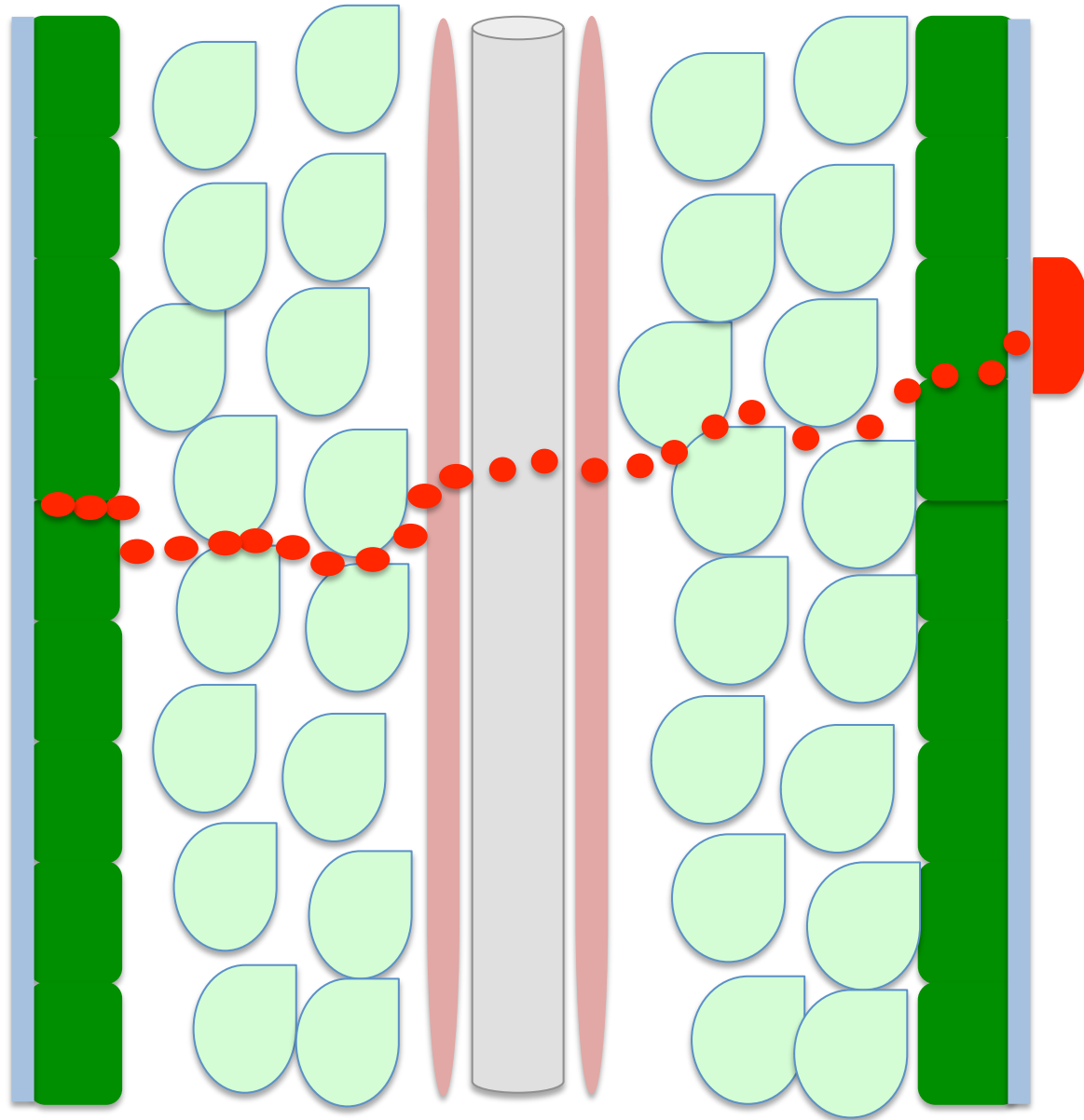
FUNGICIDE MOBILITY (PHYTOMOBIITY)

- Contacts (ex. Bravo or Dithane)
 - Applied to the surface of a plant
 - Do not move on the surface or into the plant
 - Can be readily washed from the plant surface
 - New plant growth must be protected
 - Used preventatively only
- Penetrants (ex. Headline or Tilt)
 - *Local (Translaminar) penetrant*; can move from one side of the leaf to the other
 - *Acropetal penetrant*; move only upwards in a plant in a water potential gradient
 - *Systemic penetrant*; move upwards and downwards in a plant; very few fungicides actually move systemically





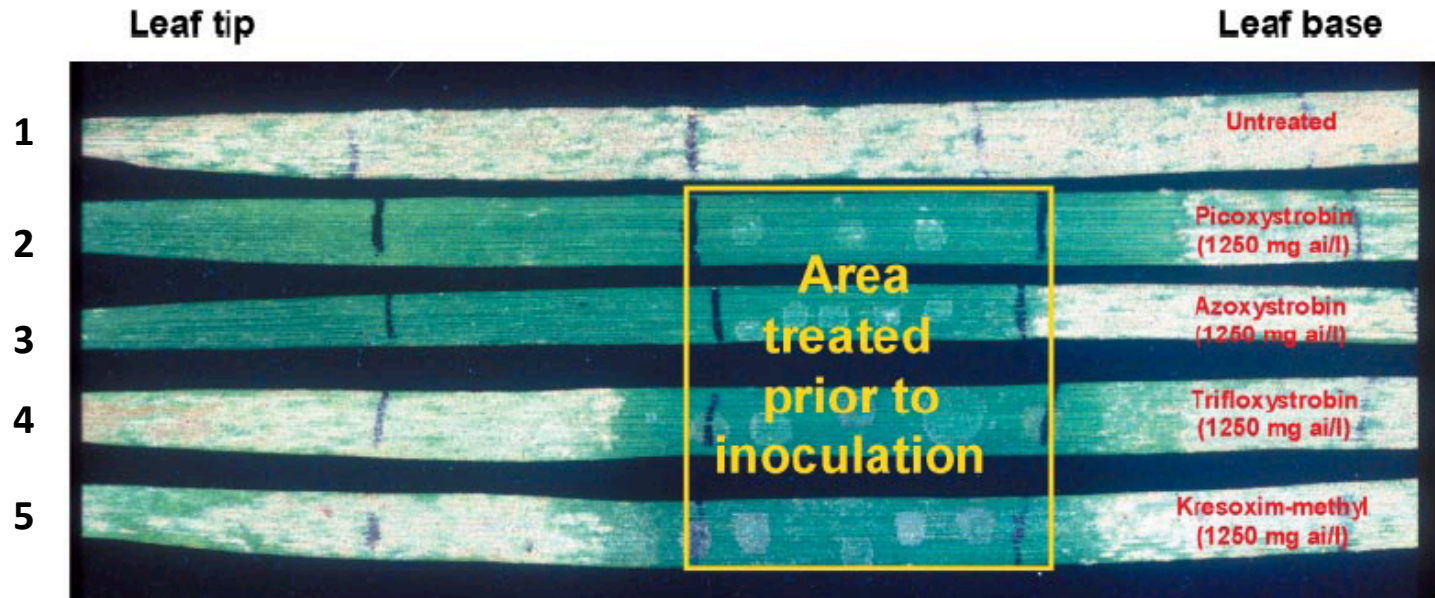
Localized (Translaminar) Penetrant (Some Strobilurins)



The diagram illustrates a microfluidic setup for cell sorting. A central gray channel is flanked by green regions containing light green cells. Red dots, representing particles, are shown moving from the central channel towards the right green region. A red semi-circle is located on the far right, possibly representing a collection or detection point.

Image Credit: "A Practical Guide to Turfgrass Fungicides" by Richard Latin, Purdue University

Acropetal penetrant (xylem mobile)



Bartlett et al., 2002 Pest Management Science 58:649-662

Localized penetrant (translaminar)



FUNGICIDE COVERAGE CRITICAL FOR WHITE MOLD CONTROL

- No fungicides move downward for soybean
- *Sclerotinia sclerotiorum* is a soilborne organism
- Canopy penetration by sprayer critical
 - Uniform coverage important



Photo from "Fungicides for Field Crops" Mueller et al., 2013



2013 FUNGICIDE TRIAL

- Arlington, WI - Naturally Infested Field Rotated with Sunflower
- Plot and Application Information
 - 6-row, 15-in. spacing
 - Planting population of 175,000 seeds/a
 - 21 feet long
- Misting of soybean during R1-R3 period
 - Misting during the evening only (8pm-12am)
 - Used only to keep soil surface moist to encourage apothecial development
 - No standing water
 - Soil surface allowed to dry during the day



TREATMENTS

- See your proceedings for complete details of treatments (Pg. 147)
- Application of fungicide conducted using a CO₂ pressurized backpack sprayer calibrated to deliver 20 GPA
- Treatments applied at R1, R3, or both

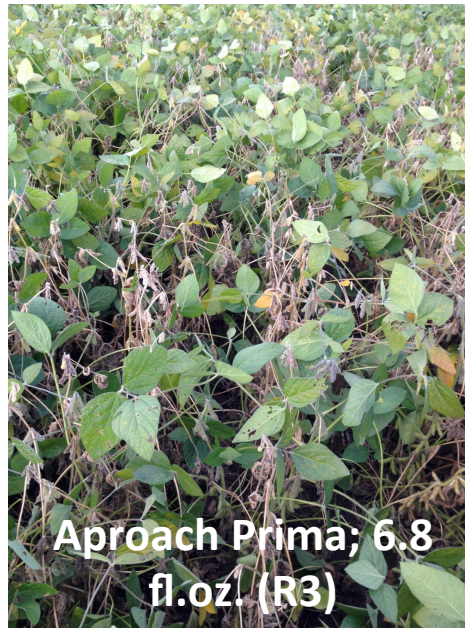
Treatment and Rate/Acre (Crop Growth Stage at Application)	
Non-treated Check.....	
Approach Prima 2.34SC 6.8 fl.oz. + Induce 90SL 0.25% v/v (R3)	
Domark 40ME 5.0 fl.oz. + Induce 90SL 0.25% v/v (R1)	
Proline 480SC 5.0 fl.oz. (R1)	
Incognito 4.5FL 20.0 fl.oz. + Induce 90SL 0.25% v/v (R1)	
Priaxor 4.17SC 4.0 fl.oz. + Induce 90SL 0.25% v/v (R3).....	
Domark 40ME 5.0 fl.oz. + Induce 90SL 0.25% v/v (R3)	
Priaxor 4.17SC 4.0 fl.oz. + Induce 90SL 0.25% v/v (R1).....	
Endura 70WG 6.0 oz. + Induce 90SL 0.25% v/v (R1).....	
Cobra 2EC 6.0 fl.oz. + Induce 90SL 0.25% v/v (R1)	
Approach 2.08SC 9.0 fl.oz. + Induce 90SL 0.25% v/v (R1).....	
Approach 2.08SC 9.0 fl.oz. + Induce 90SL 0.25% v/v (R1)	
Approach Prima 2.34SC 6.8 fl.oz. + Induce 90SL 0.25% v/v (R3) ..	
Proline 480SC 3.0 fl.oz. + Induce 90SL 0.25% v/v (R1).....	
Approach 2.08SC 9.0 fl.oz. + Induce 90SL 0.25% v/v (R3).....	
Approach 2.08SC 6.0 fl.oz. +Induce 90SL 0.25% v/v (R1, R3).....	
Proline 480SC 3.0 fl.oz. (R1)	
Stratego YLD 500SC 4.65 fl.oz. (R3).....	
Approach Prima 2.34SC 6.8 fl.oz. + Induce 90SL 0.25% v/v (R1, R3)	
Approach 2.08SC 9.0 fl.oz. +Induce 90SL 0.25% v/v (R1, R3).....	
Proline 480SC 3.0 fl.oz. (R1)	
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Endura 70WG 6.0 oz. + Induce 90SL 0.25% v/v (R1)	
Priaxor 4.17SC 4.0 fl.oz. + Induce 90SL 0.25% v/v (R3)	
Endura 70WG 8.0 oz. + Induce 90SL 0.25% v/v (R1).....	

HIGHEST AND LOWEST DSI

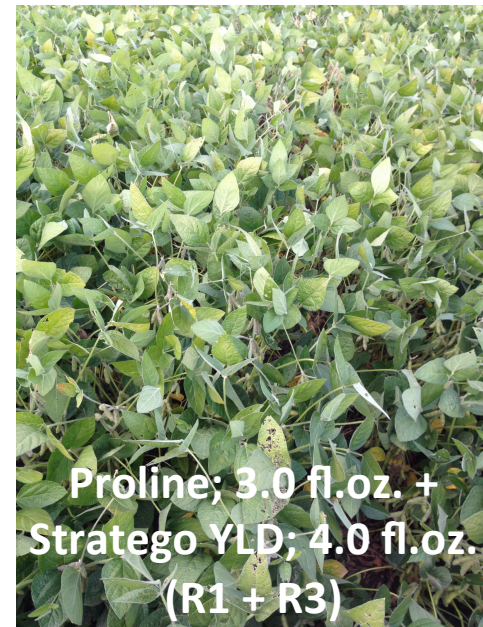
Product	Timing	Sclerotinia Stem Rot DSI (R7 Growth Stage)
Approach Prima; 6.8 fl.oz.	R3	85.6
Incognito; 20.0 fl.oz.	R1	81.4
Non-treated Control	--	77.5
Proline; 5.0 fl.oz.	R1	74.5
Priaxor; 4.0 fl.oz.	R3	74.2
Endura; 8.0 oz.	R1	38.6
Approach 9.0 fl.oz.	R1+R3	28.1
Proline; 3.0 fl.oz.+ Stratego YLD 4.0 fl.oz.	R1+R3	25.3
Cobra; 6.0 fl.oz.	R1	6.4
LSD (0.05)		37.9



TREATMENTS
WITH DSI OF 70
OR ABOVE
(9/19/2013)
AND WORST
YIELDING



TREATMENTS
WITH LOWER
DSI
(9/19/2013)
AND BEST
YIELDING
9/19/2013



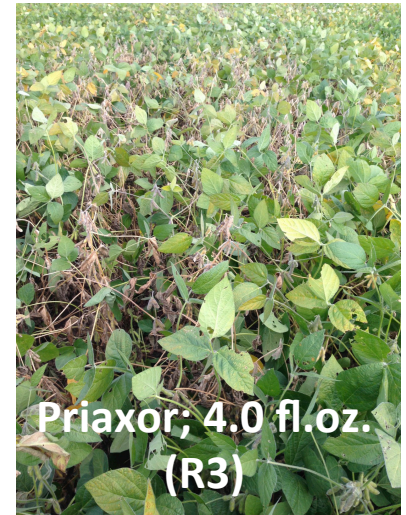
YIELD

Product	Timing	Yield (bu/a)
Approach Prima; 6.8 fl.oz.	R3	58.0
Incognito; 20.0 fl.oz.	R1	65.3
Non-treated Control	--	56.0
Proline; 5.0 fl.oz.	R1	58.7
Priaxor; 4.0 fl.oz.	R3	63.7
Endura; 8.0 oz.	R1	78.3
Approach 9.0 fl.oz.	R1+R3	73.9
Proline; 3.0 fl.oz.+ Stratego YLD 4.0 fl.oz.	R1+R3	74.0
Cobra; 6.0 fl.oz. **	R1	67.4
LSD (0.05)		10.8



STATISTICAL COMPARISON OF APPLICATION TIMING

Product	Estimated difference in DSI	Estimated difference in Yield (bu/a)
R1 Aproach or Priaxor vs. R3 Aproach or Priaxor	36 point Reduction by spraying at R1	0.1 bu/a increase by spraying at R1



2009 – DEKALB, IL WHITE MOLD FUNGICIDE TRIAL

Treatment	Incidence (%) 8-11-09	Incidence (%) 9-14-09	DSI (0-100) 9-14-09	Yield (bu/A)
Untreated	75	95	77	24
Topsin M 4.5 FL @ 20 fl oz	43	96	78	24
Proline @ 3 fl oz	38	95	70	24
Headline 6 fl oz	73	100	84	22
Domark 5 fl oz	68	98	70	23
Cobra @ 12.5 fl oz	15	51	13	42
Endura @ 8 oz (2x)	38	86	45	39
Aproach @ 8 oz (2x)	35	80	37	40
LSD 0.05	33	15	20	8

All sprayed at R1 (July 20), and those with “(2x)” were sprayed again 9 days later. Inoculated with white mold on July 21. DSI = disease severity index.

DEKALB CO., IL FUNGICIDE TRIAL - 2009

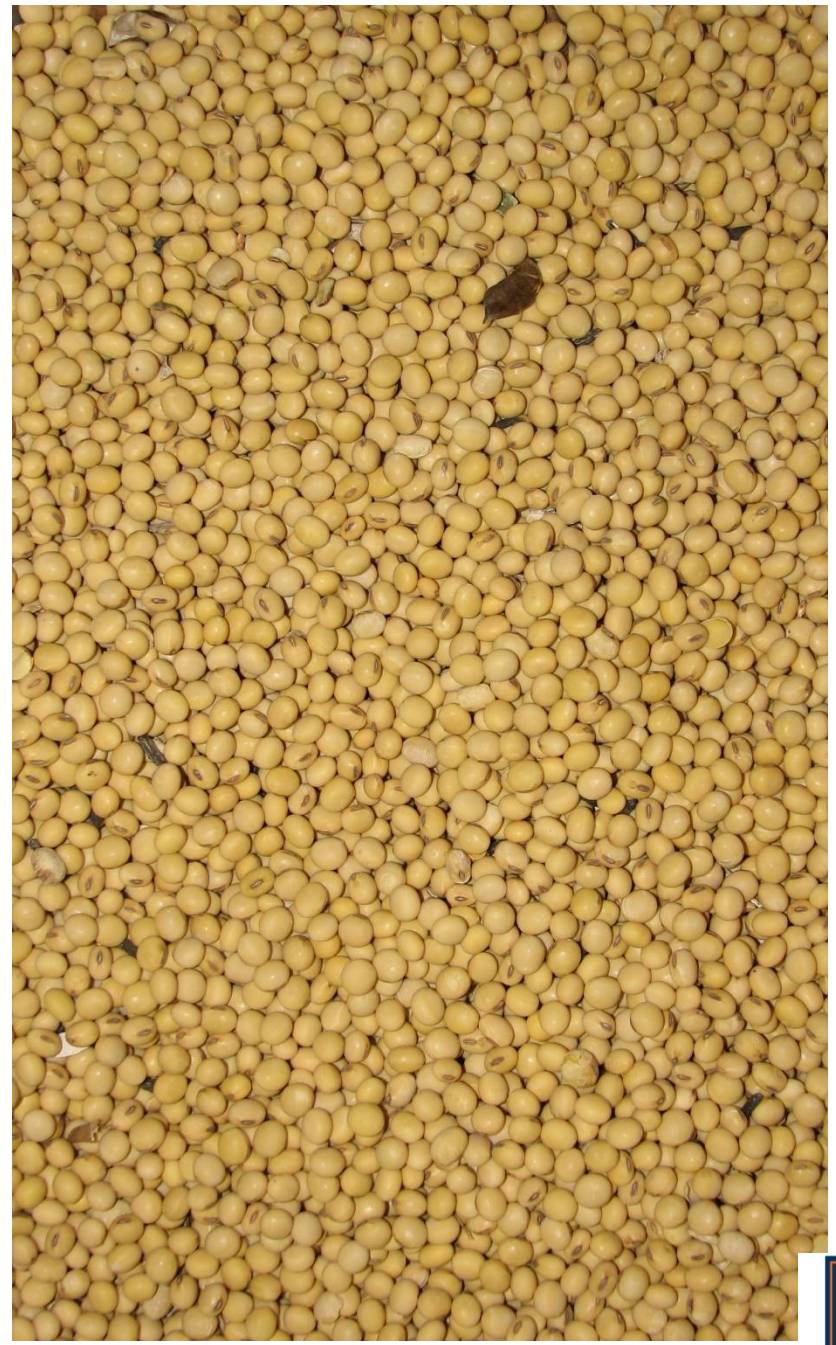


Untreated on 9/14/09



Cobra on 9/14/09





2013 – DEKALB, IL WHITE MOLD FUNGICIDE TRIAL

Treatment	Incidence (%) 9-19-13	DSI (0-100) 9-19-13	Yield (bu/A)
Untreated	33	28	53
Fortix @ 5 fl oz	15	13	56
Incognito 4.5 F @ 20 fl oz	20	18	68
Incognito 4.5 F @ 20 fl oz (2x)	0	0	60
Domark @ 5 fl oz	3	2	62
Endura @ 8 oz	3	1	64
Proline @ 3 fl oz	10	7	60
Proline @ 5 fl oz	5	5	60
Approach @ 9 fl oz	13	11	61
Approach @ 9 fl oz (2x)	0	0	61
Cobra @ 6 fl oz	25	24	52
LSD 0.05	22	19	7

All sprayed at R1 (July 30), and those with “(2x)” were sprayed again 10 days later. Inoculated with white mold on July 30 after fungicides dried. DSI = disease severity index.



SUMMARY

- Endura @ 8oz. (R1 Application) offered good white mold control and highest yield – as good as two application programs
- Cobra @ 6.0 fl.oz. (R1 application) offers good control of white mold but can cause a slight yield hit over an effective fungicide (WI and IL studies)
- Spraying at R1 resulted in marginally lower disease levels in WI in 2013 despite no significant increase in yield
- Good idea to target white mold fungicide applications at R1
 - Best opportunity to protect the most flowers
 - Spray coverage better because the canopy is still not as dense as at R3
 - If you can't spray at R1, you still have time all the way to R3
 - Less sclerotia formation (less inoculum for the next soybean crop) if you spray earlier



QUESTIONS?



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