

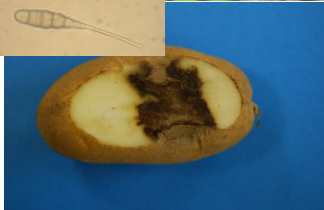
Managing Early Blight and White Mold with Fungicides

Jeff Miller



Early Blight/Brown Spot Management

- Maintain adequate fertility.
- Use fungicides preventatively.
 - Use premium products early in the season.
 - Rotate products with different modes of action.
 - A back to back application of one mode of action may be most effective.
 - Then rotate to another chemistry.
- Tank mix premium products with a protectant or another mode of action.
- Allow tuber skins to mature prior to harvest.



Early blight
Alternaria solani

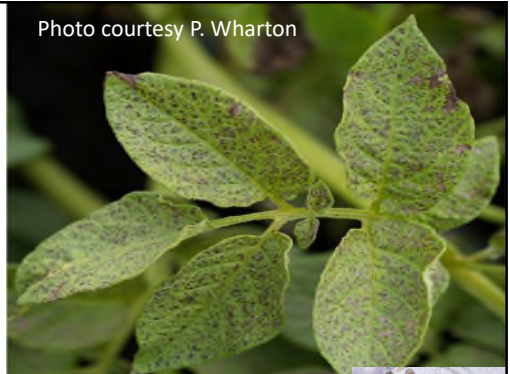


Photo courtesy P. Wharton

Brown Spot
Alternaria alternata

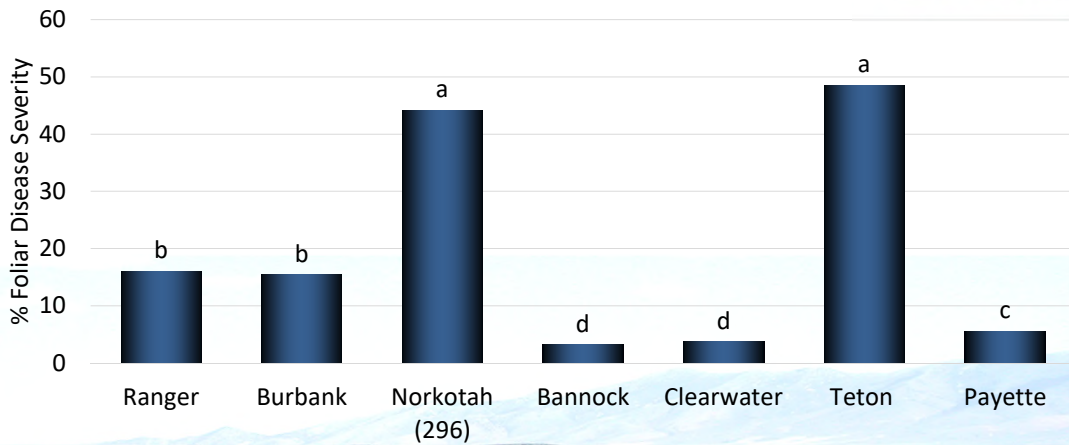


White Mold
Sclerotinia sclerotiorum



Early Blight/Brown Spot – 2018

Preliminary: Rupert, ID



“Premium” Early Blight Fungicides

- QoI Fungicides – Group 11
 - Quadris
 - Headline
 - Ento
 - Tanos
 - Reason
 - Quadris Opti (also group M5)
 - Quadris Top (also group 3)
- Pyrimethanil – Group 9
 - Luna Tranquility (also group 7)
- Organotin – Group 30
 - Super












- Triazoles (DMI) – Group 3
 - Quadris Top (also group 11)
 - Quash
 - Revus Top (also group 40)
 - (Revysol)
- Carboxamides (SDHI) – Group 7
 - Endura
 - Luna Tranquility (also group 9)
 - Miravis Prime (also group 12)
 - Priaxor
 - Vertisan

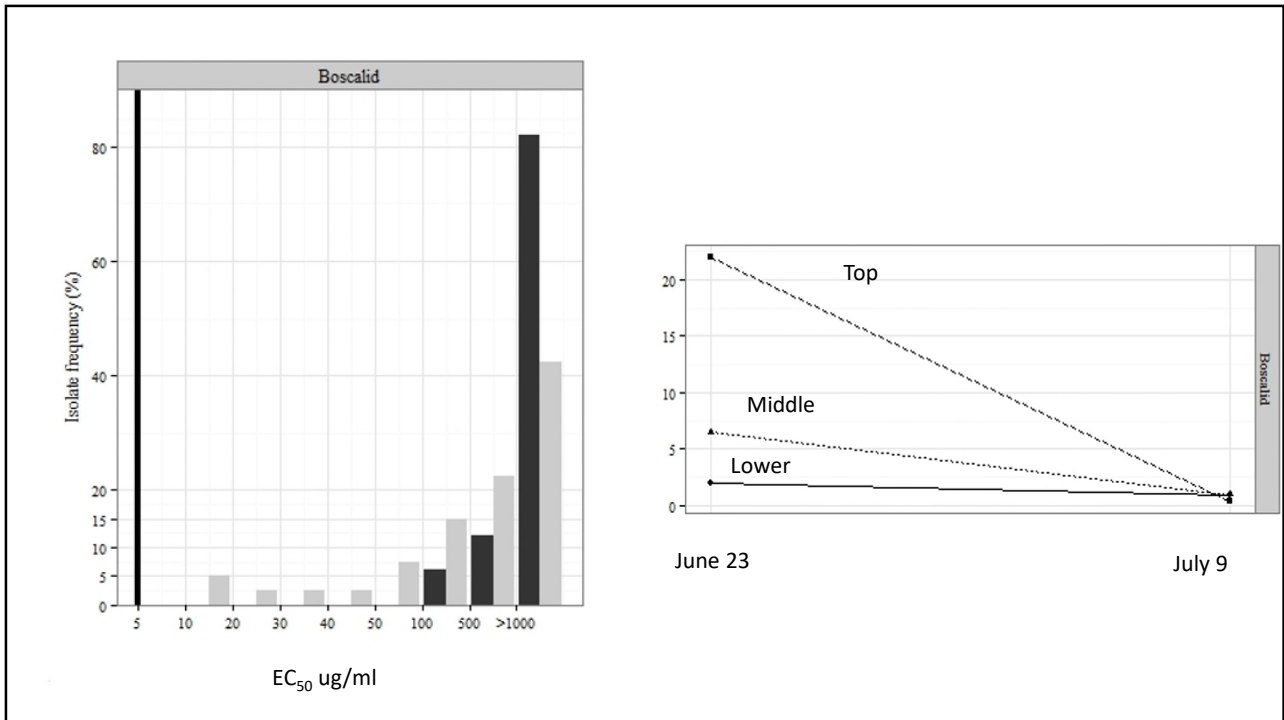
Resistance

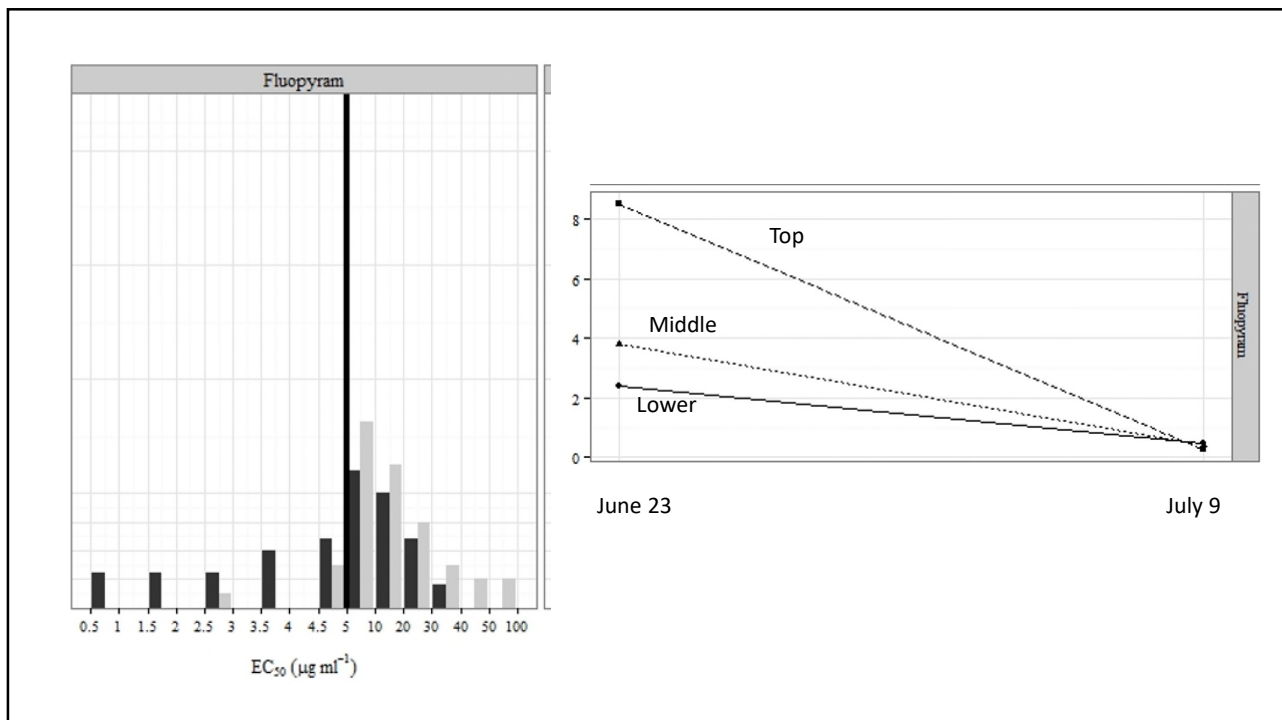
Efficacy?

Toxicity

Efficacy?

C. respiration	C2 complex II: succinate-dehydro- genase	SDHI (Succinate- dehydrogenase inhibitors)	phenyl-benzamides	benodanil flutolanil mepronil		          	
			phenyl-oxo-ethyl thiophene amide	isofetamid			
			pyridinyl-ethyl- benzamides	fluopyram			
			furan- carboxamides	fenfuram			
			oxathiin- carboxamides	carboxin oxycarboxin			
			thiazole- carboxamides	thiifuzamide			
			pyrazole-4- carboxamides	benzovindiflupyr			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 ERAC SDHI Guidelines for resistance management.
				bixafen			
				fluidinapyr			
				fluxapyroxad			
				furametpyr			
			N-cyclopropyl-N- benzyl-pyrazole- carboxamides	inpyrfluxam			
				isopyrazam			
N-methoxy-(phenyl- ethyl)-pyrazole- carboxamides	penflufen						
	penthiopyrad						
pyridine- carboxamides	sedaxane						
pyridine- carboxamides	isoflucypram						
pyridine- carboxamides	pydiflumetofen						
pyrazine- carboxamides	boscalid						
pyrazine- carboxamides	pyraziflumid						





How do you avoid fungicide resistance?

1. Apply fungicides in a preventative, not curative manner.
 - Avoid “rescue” treatments
2. Apply products at the recommended rate.
3. Rotate products – use different chemistry groups.
 - Reduce the overall use of the fungicide in question
4. Tank mix two different active ingredients for the target pathogen.

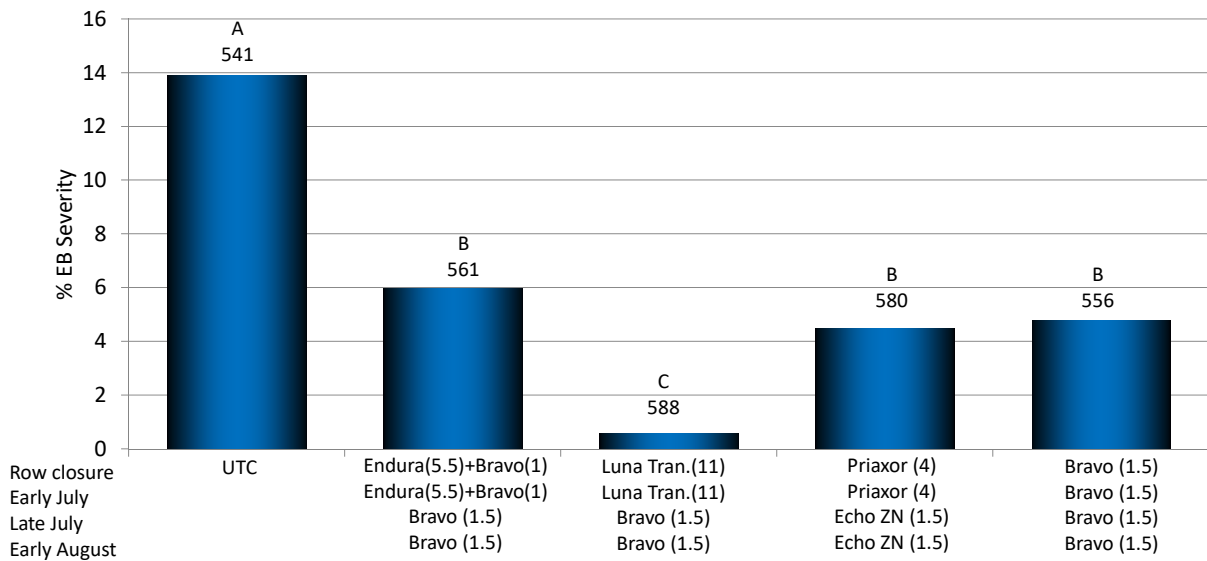


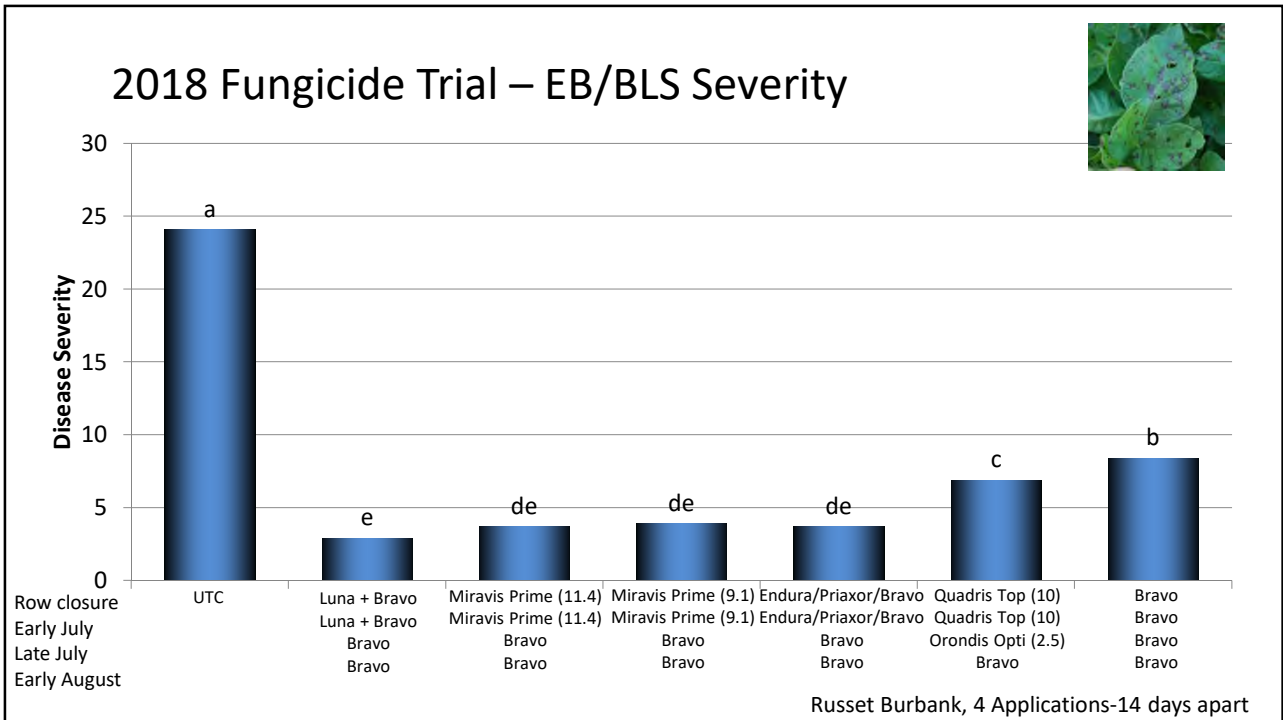
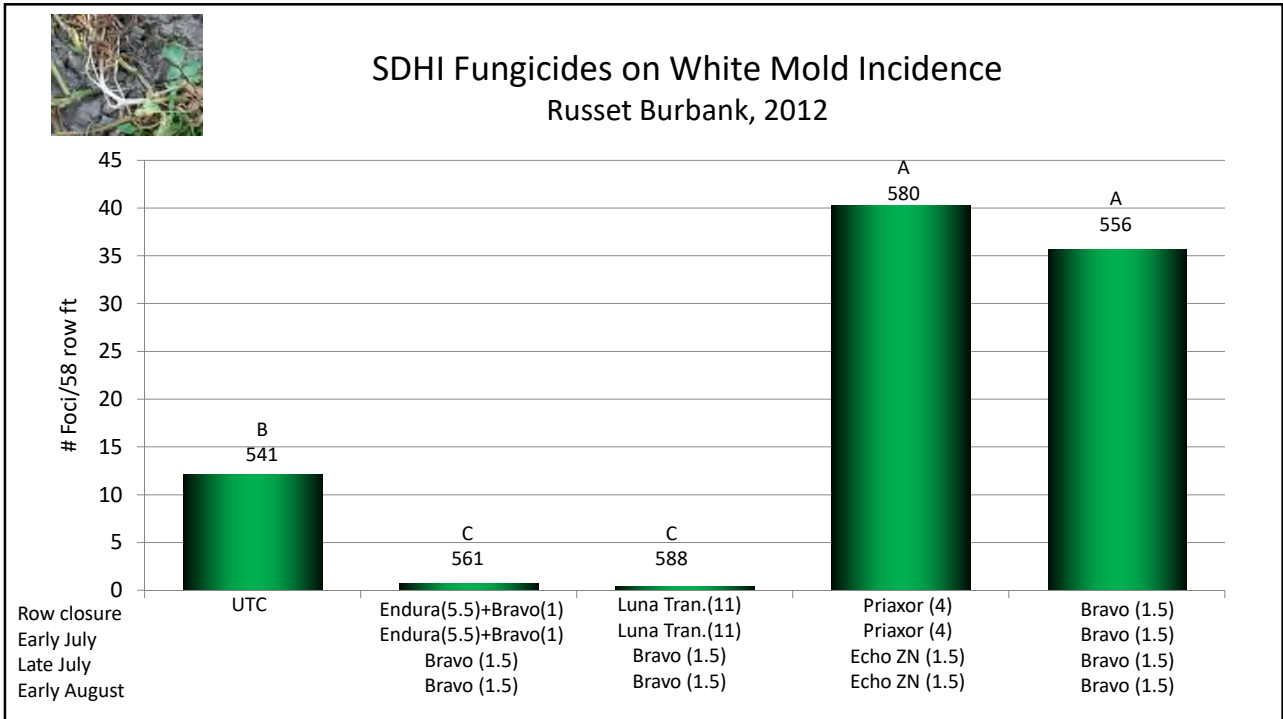
Products Tested in IPC-Funded Trials

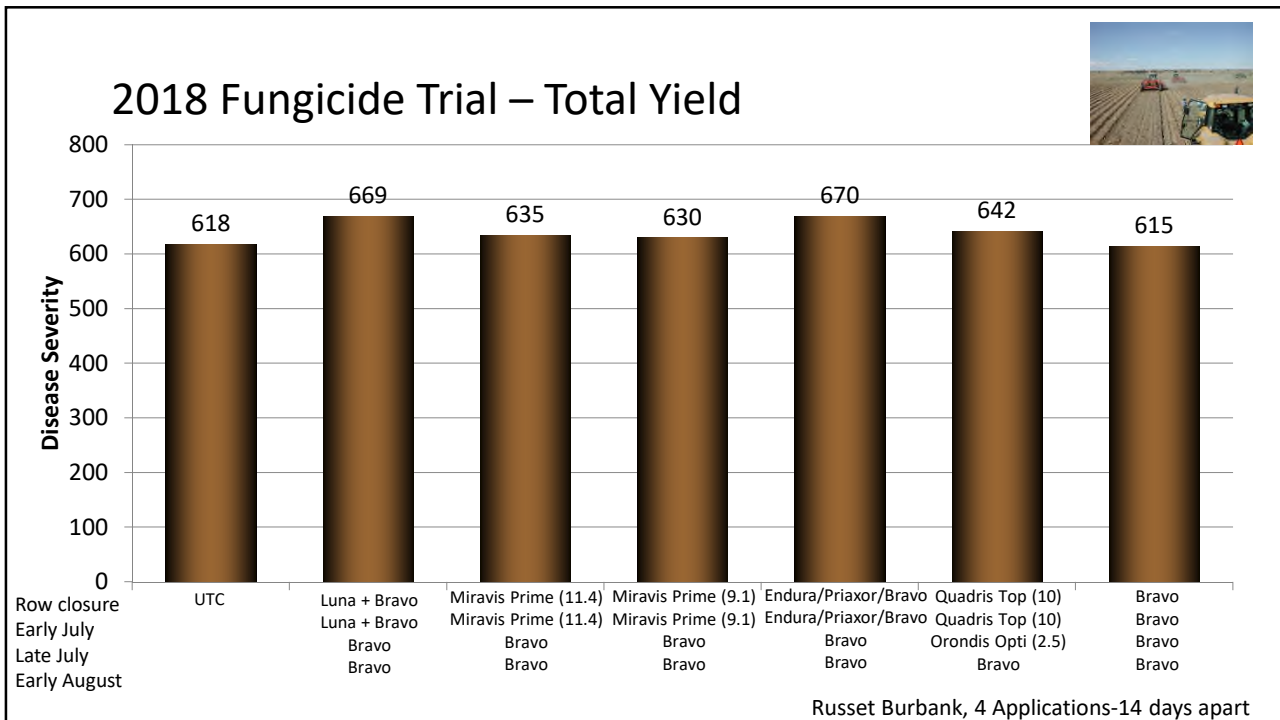
Amplitude	Gem	Penncozeb	Super Tin
Aproach	Headline	Polyram	Tanos
Badge SC	Inspire	Priaxor	Vertisan
Bravo WS	Lifegard	Quadris	Wetcit
Cabrio Plus	Luna Privilege	Quash	Zing!
Cupridyne	Luna Tranquility	Reason	Zoxium
Dithane F45 and DF	Manzate	Regalia	
Double Nickel	Omega	Revus Top	
Echo DF and ZN	Omega Top	Rovral	
Endura	Quadris	Scala	
Gavel	Quadris Top	Serenade	



SDHI Fungicides on Early Blight Severity Russet Burbank, 2012





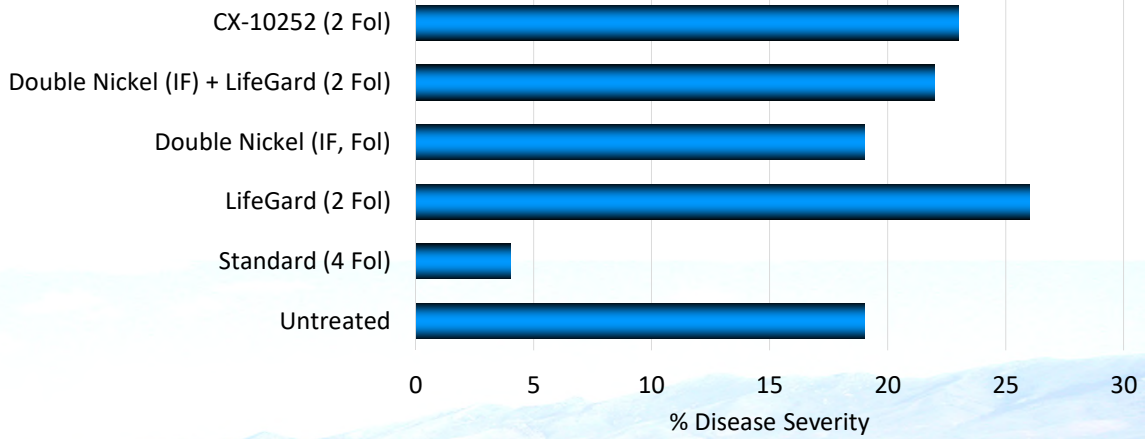


SDHI Tank-Mix Options

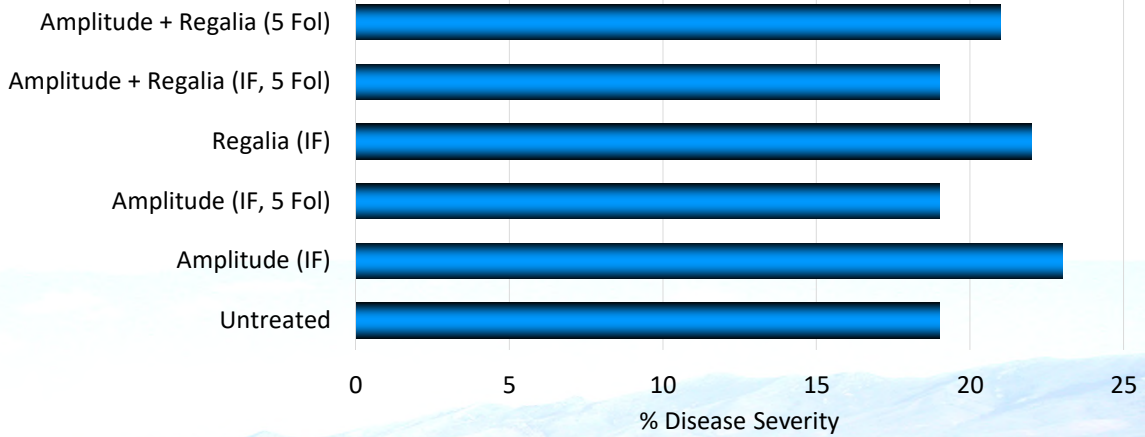
- Pre-mix
 - Luna Tranquility – fluopyram + pyrimethanil (Scala, 9)
 - Priaxor – fluxapyroxad + pyraclostrobin (Headline, 11)
 - Miravis Prime – pydiflumetofen + fludioxonil (Maxim, 12)
- Triazoles
 - E.g. Metconazole – increase in yield pays for added product cost
 - Revus Top – added premium late blight protection
- Protectants (Chlorothalonil, EBDC)
 - Adds base level late blight protection



Biological Products – Early Blight/Brown Spot Severity August 31

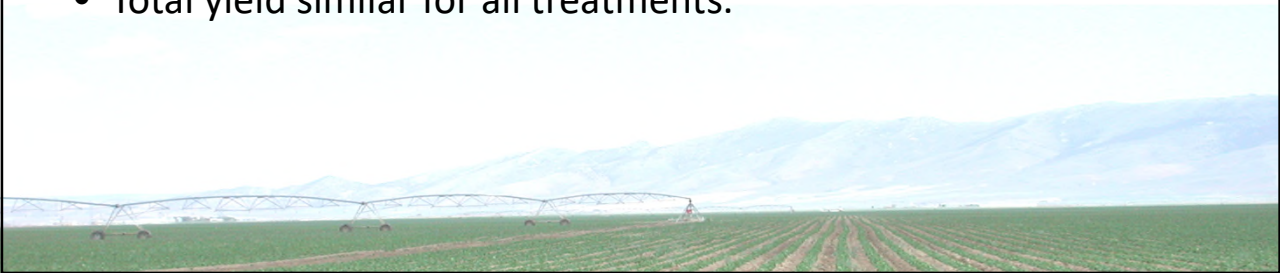


Biological Products – Early Blight/Brown Spot Severity August 31



Biologicals – Other Observations

- Emergence generally similar for all treatments.
- No effect on stem number.
- Biological products didn't improve vigor.
- White mold, pink rot pressure very low.
- Total yield similar for all treatments.



Other Challenges and Constraints

- Availability of products and MRL issues
- Pressure to reduce certain active ingredients
- Piling on products in a single application
- Industry/personal attitudes
 - Some sales driven by profit margin or relationships, not biology
 - “Good Insurance Program” approach
 - “Better than the neighbor”
 - “Sunk Cost” issues



Summary

- Use premium products early in the season.
- Rotate products with different modes of action.
 - A back to back application of one mode of action may be most effective.
 - Then rotate to another chemistry.
- Use of metconazole can improve yield (beyond disease control).
- Tank mix premium products with a protectant.



Thank You!

