Foliar fungicides for wheat

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Some basic principles of foliar fungicide use

Foliar fungicides protect against yield reductions caused by fungal pathogens.

Fungicides don't protect against bacteria or viruses.

Foliar fungicides do not protect against diseases affecting roots.

Foliar fungicides protect only plant tissues that were sprayed.

Fungicides differ in mode of action, efficacy against specific diseases, and duration of protection.

Fungicides are most effective when they are used as part of an integrated management strategy.

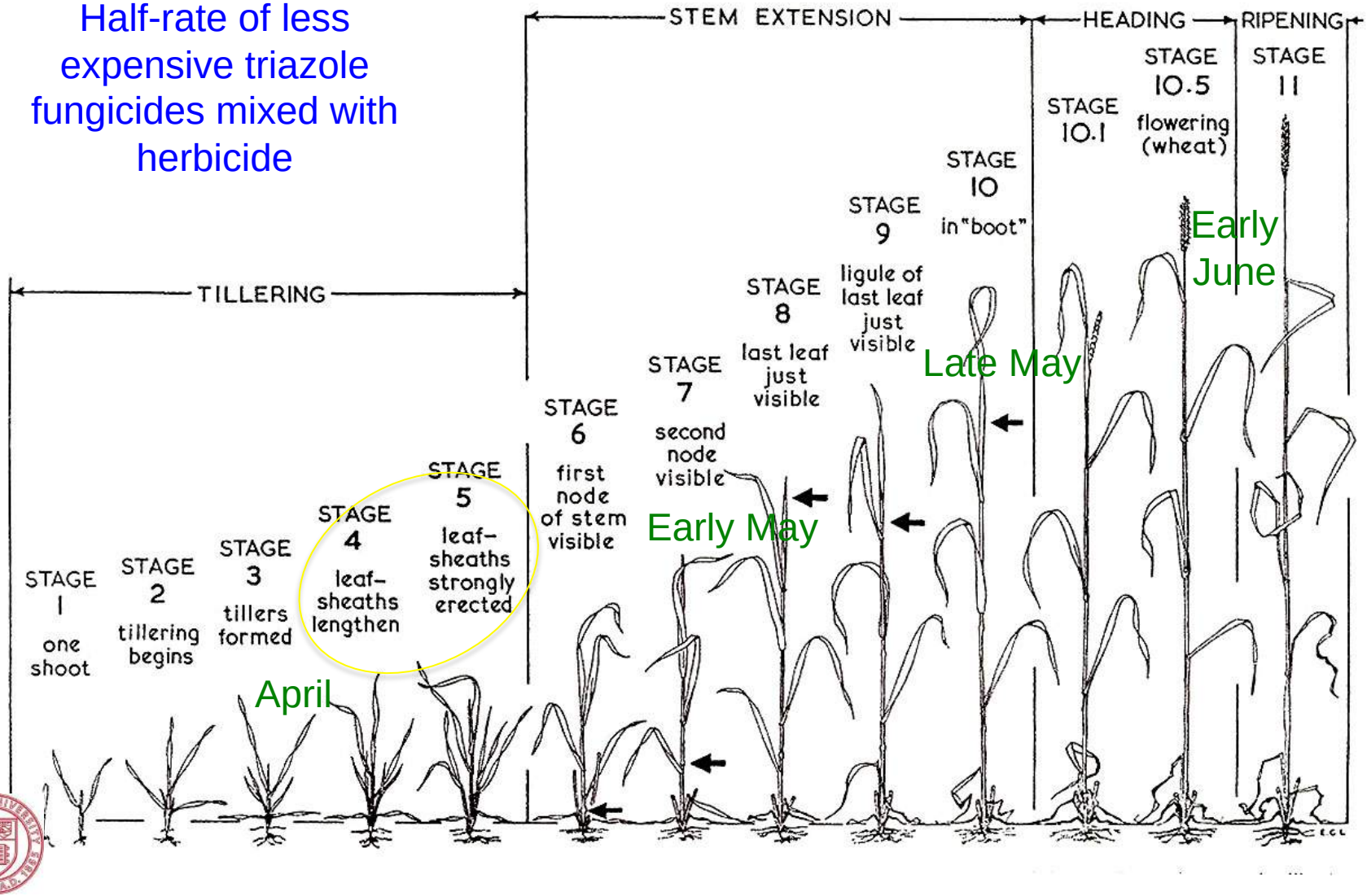
Disease targets of foliar fungicides in New York wheat

The primary targets of foliar fungicides are fungal foliar diseases …

… as well as Fusarium head blight and glume blotch.

Fungicide application at spring herbicide timing

Half-rate of less expensive triazole fungicides mixed with herbicide



Foliar fungicides applied at herbicide timing

GROUP 3 FUNGICIDE

Triazoles

propiconazole (41.8%) products:

Tilt®

PropiMax® EC

Bumper® 41.8 EC FUNGICIDE

tebuconazole (38.7%) products:
'Folicur-like generics'

Tebuzol™

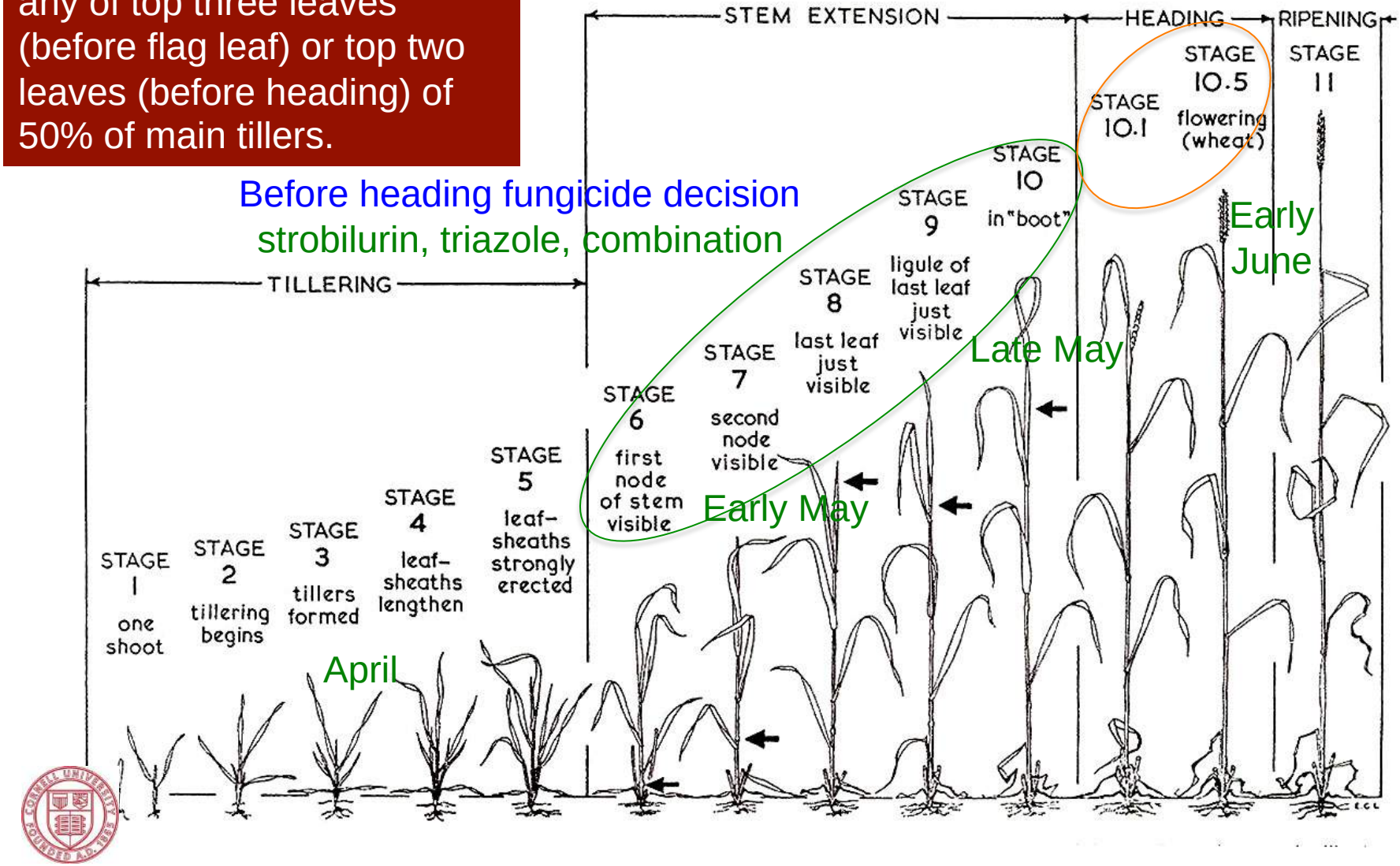
Post-patent, inexpensive products
Good foliar disease control, but less effective FHB suppression
Good options for foliar disease control at early growth stages

Fungicide application decisions from stem elongation to heading

Based on fungal disease on any of top three leaves (before flag leaf) or top two leaves (before heading) of 50% of main tillers.

Heading to flowering fungicide decision

triazole



Before heading fungicide decision

strobilurin, triazole, combination

Foliar fungicides applied from jointing to heading

GROUP 11 FUNGICIDES

Solo strobilurin product:

Headline® SC fungicide — pyraclostrobin (23.3%)

GROUP 3 11 FUNGICIDES

triazole & strobilurin combination products:

ABSOLUTE® — tebuconazole (22.6%) & trifloxystrobin (22.6%)

Quilt® Fungicide — propiconazole (11.7%) & azoxystrobin (7.0%)

Quilt Xcel™ Fungicide — propiconazole (11.7%) & azoxystrobin (13.5%)

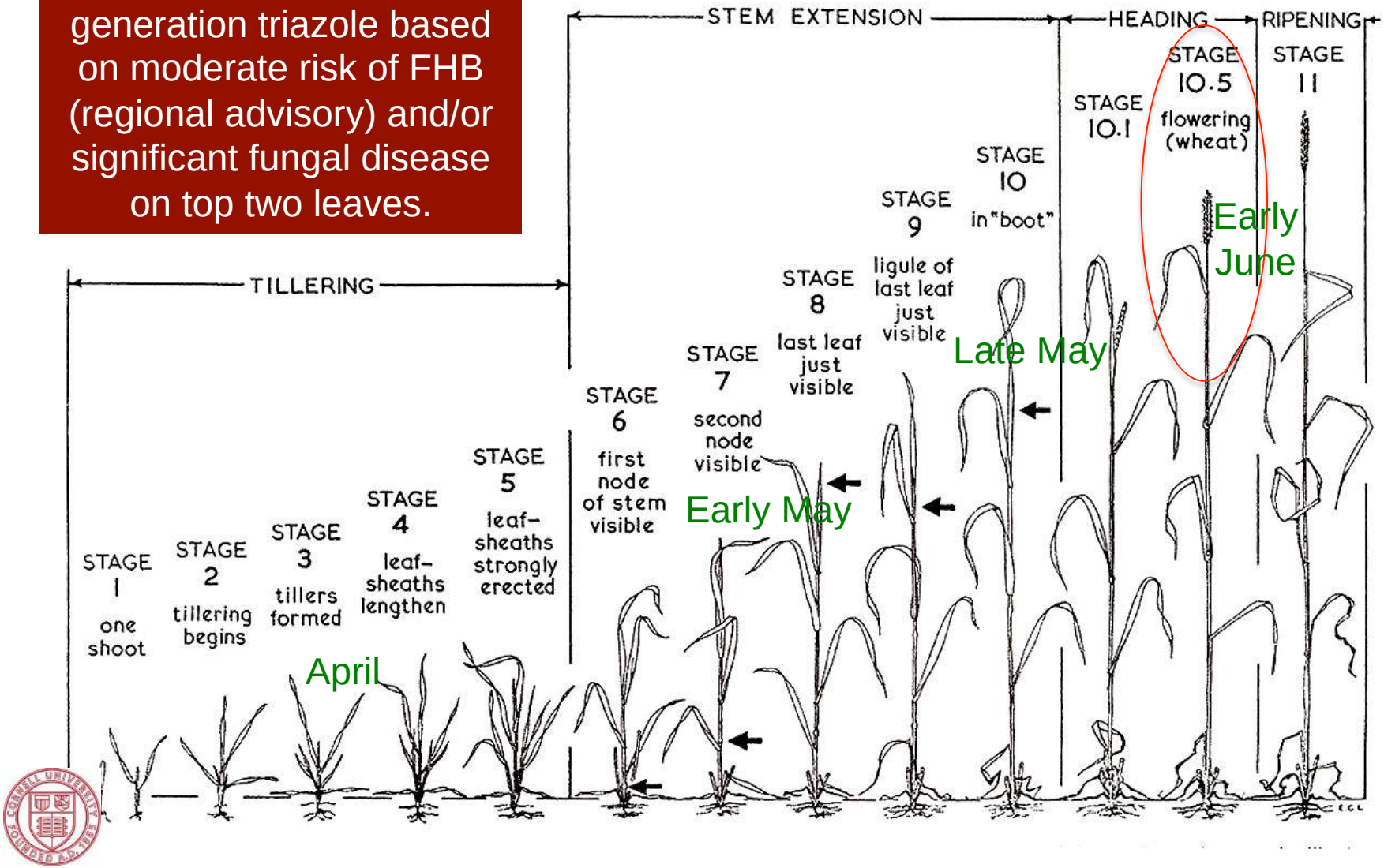
STRATEGO® YLD — prothioconazole (10.8%) & trifloxystrobin (32.3%)

TWINLINE™ FUNGICIDE — metconazole (7.4%) & pyraclostrobin (12%)

Broad spectrum foliar disease control prior to flag leaf emergence
Strobilurin may result in an increase in DON toxin if applied after spike emergence

Triazole fungicide applied at initiation of flowering

Spray with a second generation triazole based on moderate risk of FHB (regional advisory) and/or significant fungal disease on top two leaves.



Suppression of Fusarium head blight (scab)

Reduction of deoxynivalenol (DON) in grain

FDA guideline for nonmilled grain is < 2 ppm

FDA guideline for food products is < 1 ppm

Foliar fungicides applied at initiation of flowering

GROUP 3 FUNGICIDE

Triazoles

CARAMBA™ FUNGICIDE

metconazole (8.6%)

PROSARO®

prothioconazole (19%)
& tebuconazole (19%)

PROLINE™ ENHANCED PERFORMANCE

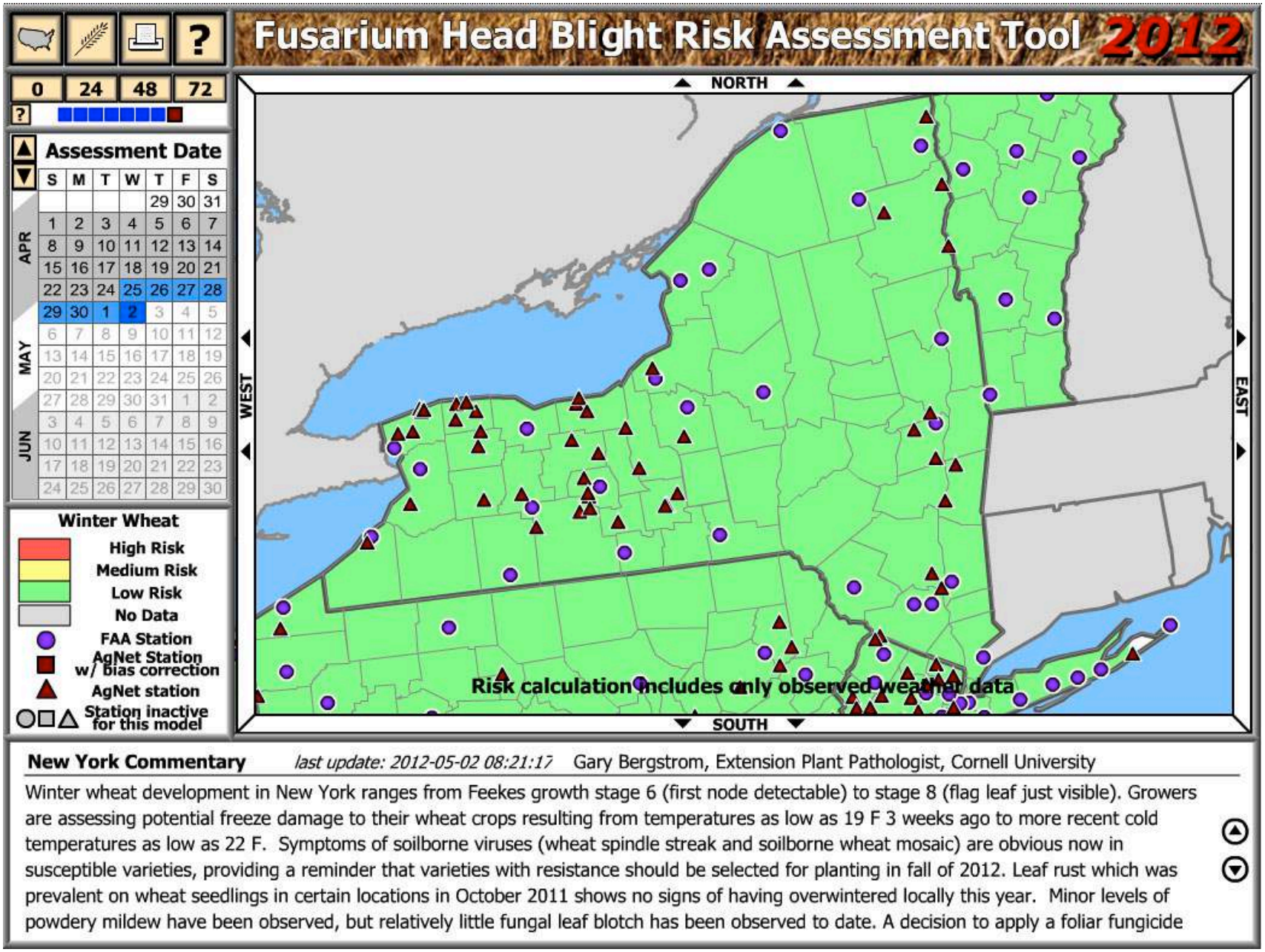
prothioconazole (41%)

Very good foliar disease control, and good FHB suppression
Materials of choice for head emergence to flowering application

Fungicidal suppression of FHB & DON – meta-analysis of 100 U.S. test environments*

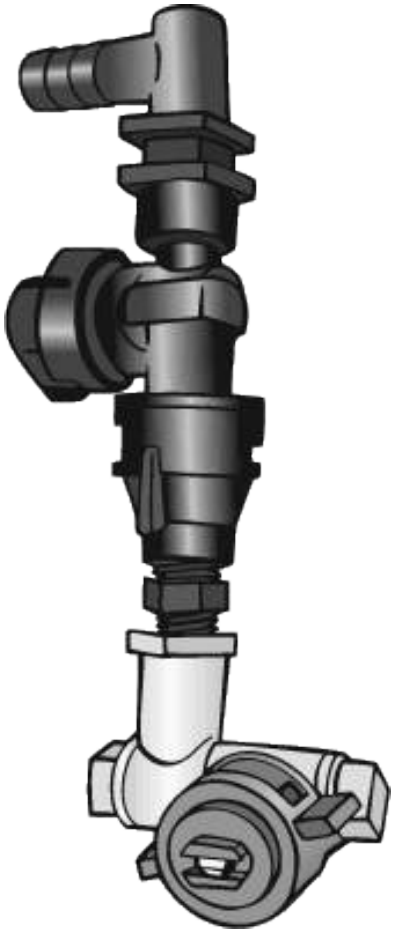
	% Suppression compared to non-treated	
Triazole fungicide:	Fusarium head blight disease	DON toxin
CARAMBA FUNGICIDE metconazole 86%	50	45
PROLINE ENHANCED PERFORMANCE prothioconazole 41%	48	43
PROSARO prothioconazole 19% & tebuconazole 19%	52	42
Tebuzol tebuconazole 38.7%	40	23
Tilt propiconazole 41.8%	32	12

*Paul et al. 2008. Phytopathology 98:999-1011



http://www.wheatscab.psu.edu/riskTool.html

Ground application of foliar fungicides for management of FHB and DON

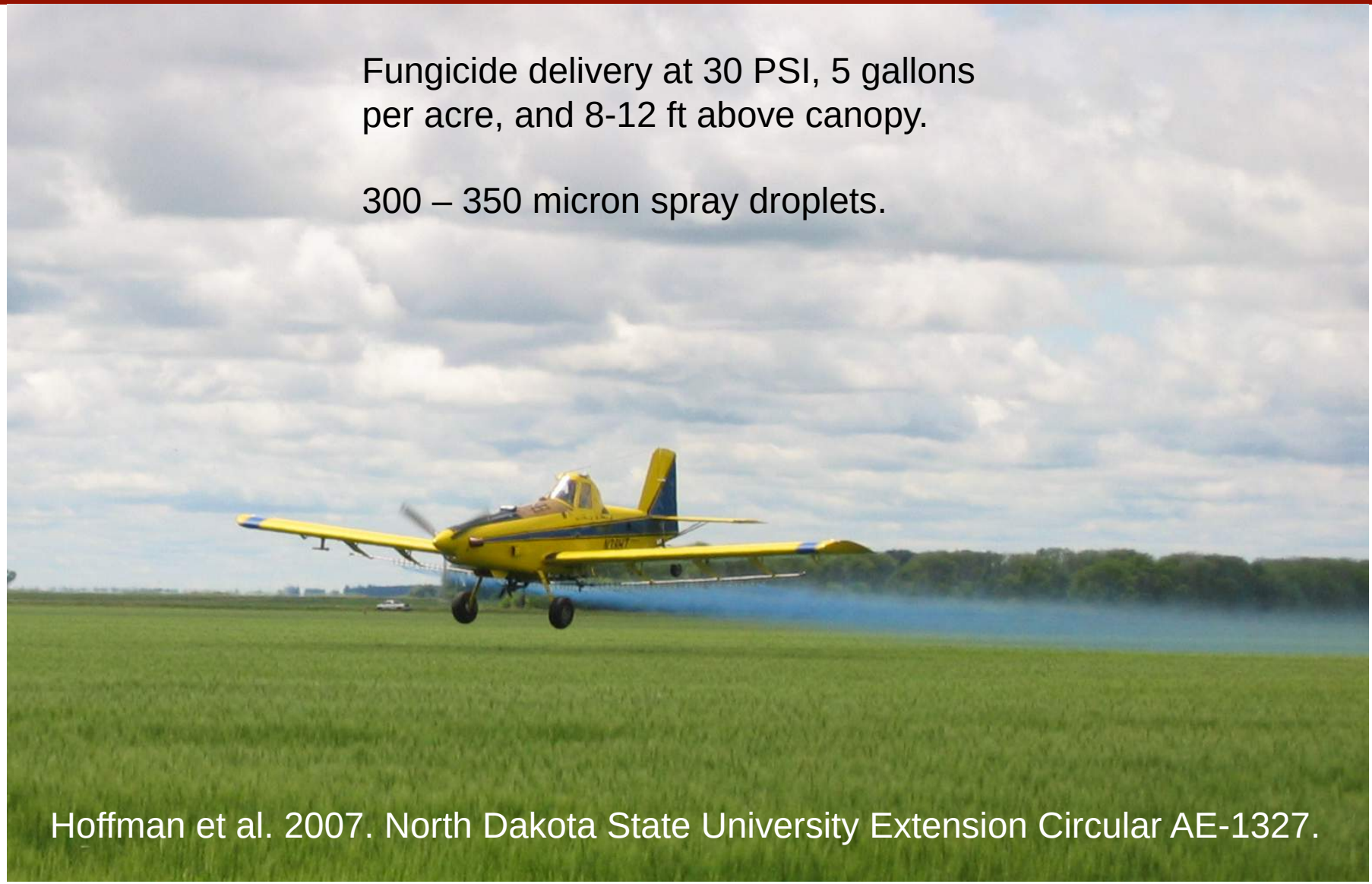


Fungicide delivery at 10 miles per hour + and 10 gallons per acre.

A single forward flat fan nozzle gives almost as much coverage and disease control as forward/backward nozzles used at slower speeds.

Halley, et al. 2008. North Dakota State University Extension Circular AE-1327

Aerial application of foliar fungicides for management of FHB and DON



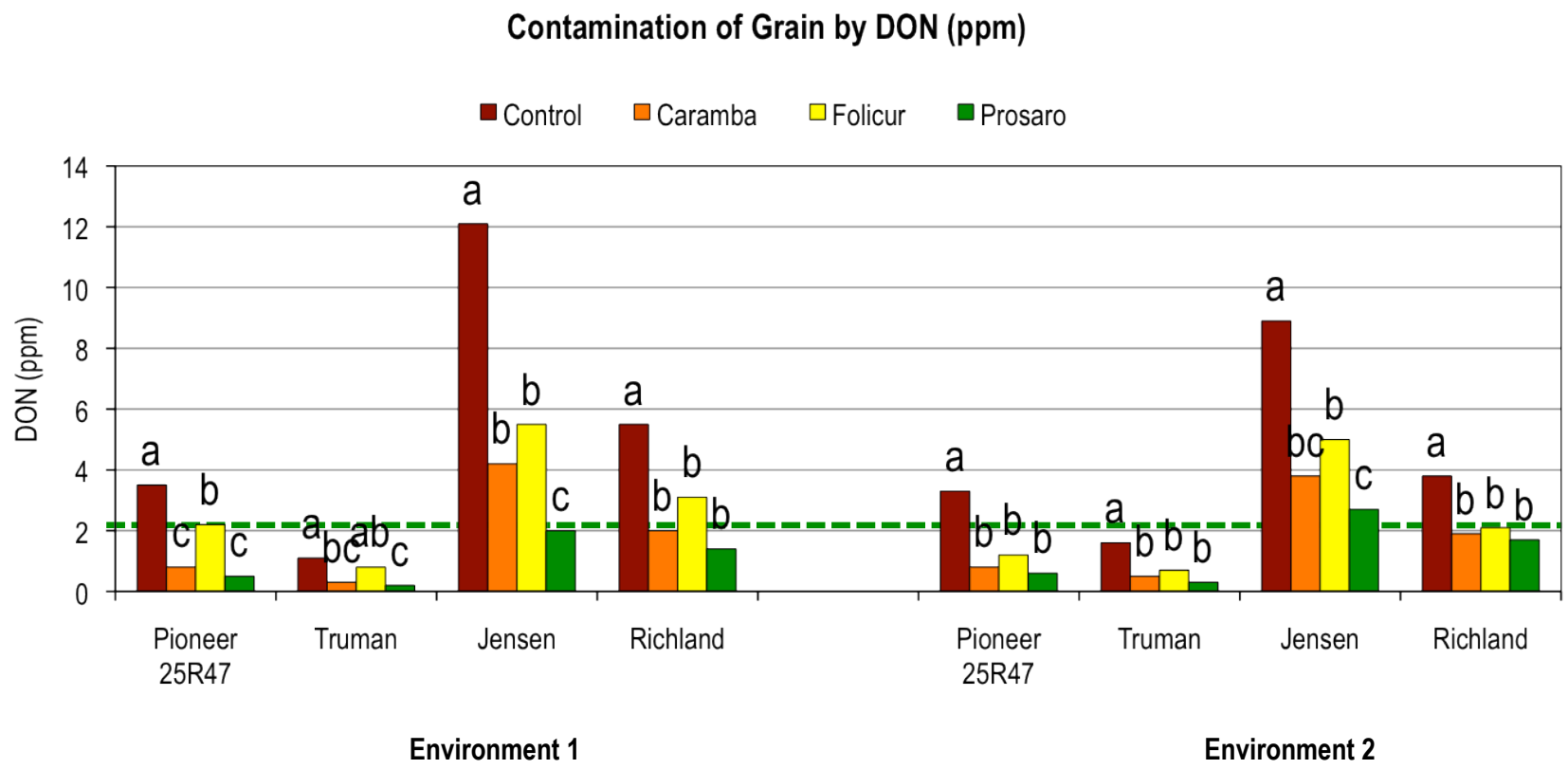
Fungicide delivery at 30 PSI, 5 gallons per acre, and 8-12 ft above canopy.

300 – 350 micron spray droplets.

Hoffman et al. 2007. North Dakota State University Extension Circular AE-1327.

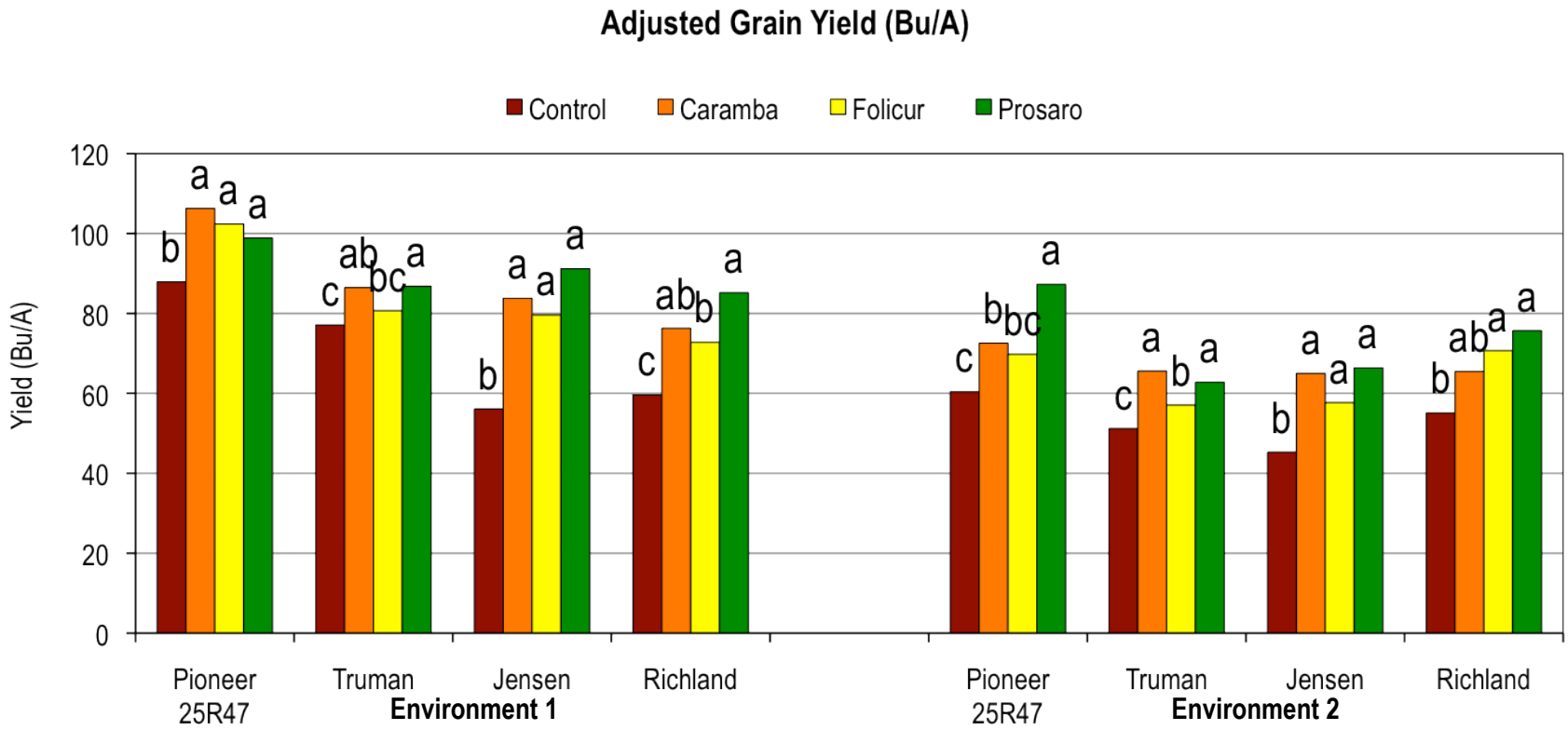
Integrating varieties and fungicides for management of FHB and DON

Effects of flowering stage application of fungicides on DON in four wheat cultivars in two environments Musgrave Farm, Aurora NY 2010



K.D. Waxman, G.C. Bergstrom, R.J. Richtmyer III, and R.R. Hahn, Cornell University

Effects of flowering stage application of fungicides on yield of four wheat cultivars in two environments. Musgrave Farm, Aurora NY 2010



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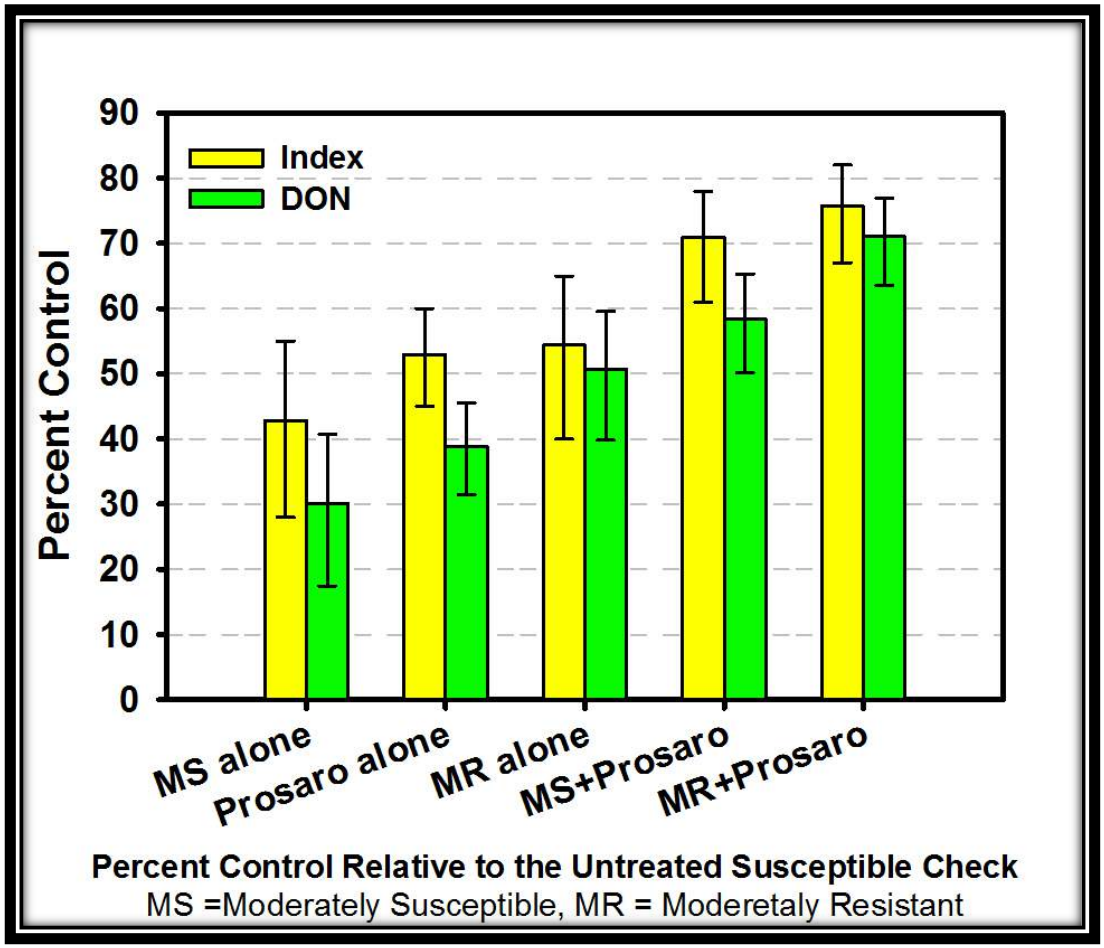
The overall mean percent control of FHB (index) and DON from 15 states



U.S. Wheat & Barley Scab Initiative

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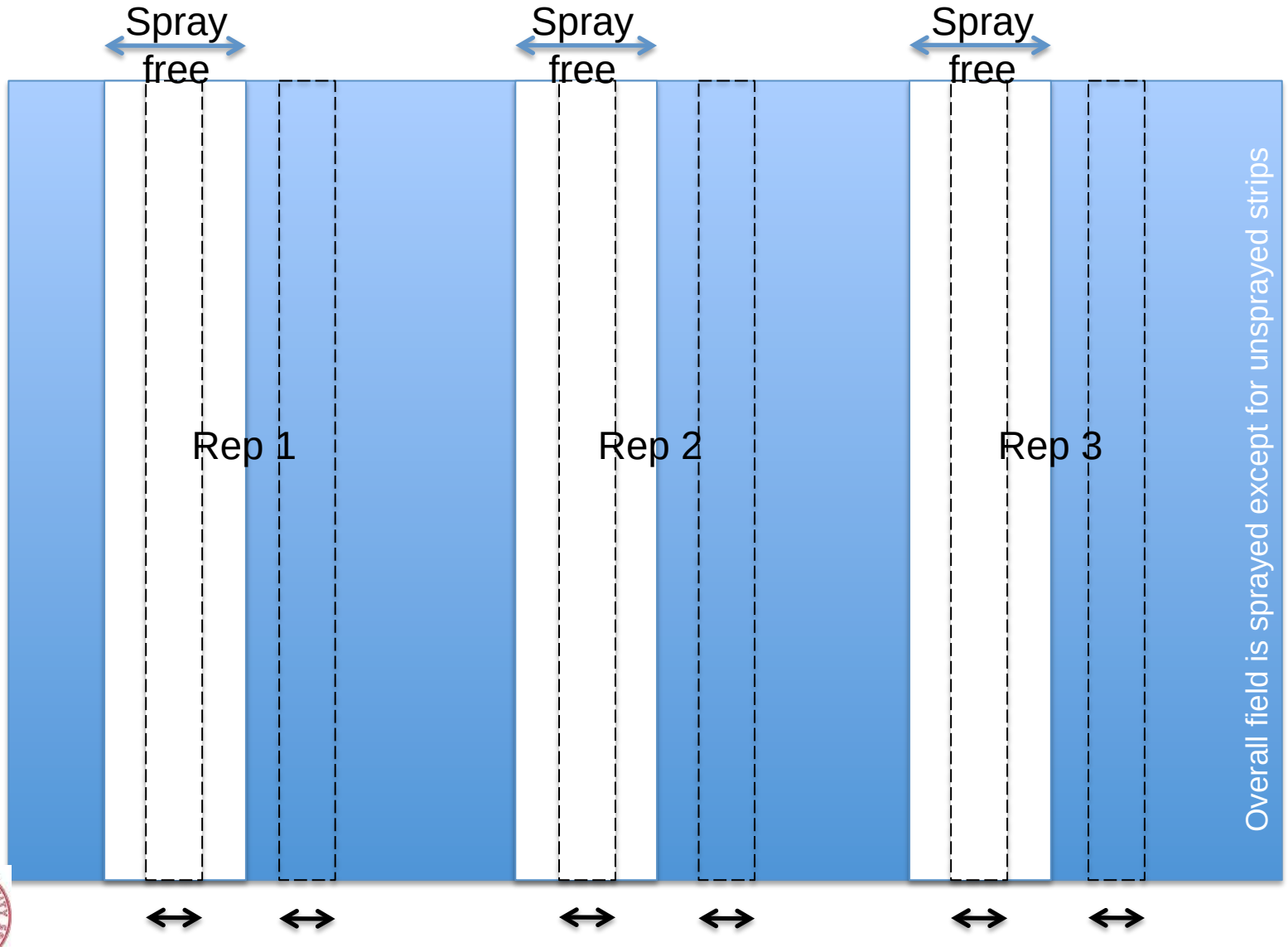
K. T. Willyerd et al. Plant Disease. 2012. Volume 96. In press.

Fungicide economics

Grain price ($/bu)	**$4**	**$5**	**$6**	**$7**	**$8**	**$9**	**$10**
Yield gain (bu/A) necessary to recoup fungicide investment*	7.5	6.0	5.0	4.3	3.8	3.3	3.0

* Assumes $30 per acre based on costs of fungicides and application; actual costs will vary

We need replicated fungicide strip data on yield and diseases!



Efficacy of fungicides for wheat disease control based on appropriate application timing

Fungicide(s)				Powdery mildew	Stagonospora leaf/glume blotch	Septoria leaf blotch	Tan spot	Stripe rust	Leaf rust	Stem rust	Fusarium head blight	Harvest Restriction
Class	Active ingredient	Product	Rate/A (fl. oz)									Aerial application in NYS?
Strobi -lurin	Pyraclostrobin 23.3%	Headline SC	6.0 - 9.0	G	VG	VG	E	E[2]	E	G	NL	Feekes 10.5 Yes, aerial appl.[3]
Triazole	Metconazole 8.6%	Caramba 0.75 SL	10.0 - 17.0	VG	VG	--[4]	VG	E	E	E	G	30 days Yes, aerial appl.
	Propiconazole 41.8%	Fitness 3.6 EC PropiMax 3.6 EC Tilt 3.6 EC	4.0	VG	VG	VG	VG	VG	VG	VG	P	Feekes 10.5 Yes, aerial appl.
	Prothioconazole 41%	Proline 480 SC	5.0 - 5.7[5]	--[4]	VG	VG	VG	--[4]	VG	VG	G	30 days Yes, aerial appl.
	Tebuconazole 38.7%	Tebuzol 3.6 F	4.0	G[6]	VG[6]	VG[6]	VG[6]	E	E	E	F	30 days No aerial appl.
	Prothioconazole19% Tebuconazole 19%	Prosaro 421 SC	6.5 - 8.2	G	VG	VG	VG	E	E	E	G	30 days No aerial appl.
Mixed class	Metconazole 7.4% Pyraclostrobin 12%	TwinLine 1.75 EC	7.0 – 9.0	G	VG	VG	E	E	E	VG	NL	Feekes 10.5 and 30 days No aerial appl.
	Propiconazole 11.7% Azoxystrobin 7.0%	Quilt 200 SC	14.0	VG	VG	VG	VG	E	E	VG	NL	Feekes 10.5 Yes, aerial appl.
	Propiconazole 11.7% Azoxystrobin 13.5%	Quilt Xcel 2.2 SE	10.5 - 14.0	VG	VG	VG	VG	E	E	VG	NL	Feekes 10.5 Yes, aerial appl.
	Prothioconazole 10.8% Trifloxystrobin 32.3%	Stratego YLD	4.0	G	VG	VG	VG	VG	VG	VG	NL	35 days No aerial appl.
	Tebuconazole 22.6% Trifloxystrobin 22.6%	Absolute 500 SC	5.0	G	VG	VG	VG	VG	VG	VG	NL	35 days No aerial appl.

Adapted for New York by Gary C. Bergstrom from information developed by the USDA-NIFA Committee on Management of Small Grain Cereal Diseases (NCERA-184).
Updated on May 3, 2012.

Be sure to apply fungicides according to label directions!