

# Getting Started with Wheat Agronomy

MSU EXTENSION 2016 BEGINNING FARMER WEBINAR SERIES



TWENTY THREE EVENING WEBINARS FOR PEOPLE WANTING TO 'GET STARTED' FARMING =

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Wheat Systems Specialist, MSU



# Agenda

- Why plant wheat?
- Fall management
- Spring/summer management
- Cost of production



# Why put wheat in the rotation?

- ↑ corn acres
- ↑ soybean acres
- ↓ wheat and other rotation crops

Loss of rotational diversity causes:

- ↓ soil organic matter
- ↓ aggregate stability
- ↓ soil quality
- ↑ soil erosion
- ↑ GHG emissions
- ↓ yield potential
- ↓ yield stability



# Wheat Rotation Study

- Ridgetown Long Term Rotation Study
- Five crop rotations
  - C-C
  - C-S
  - C-S-W
  - S-S
  - S-W

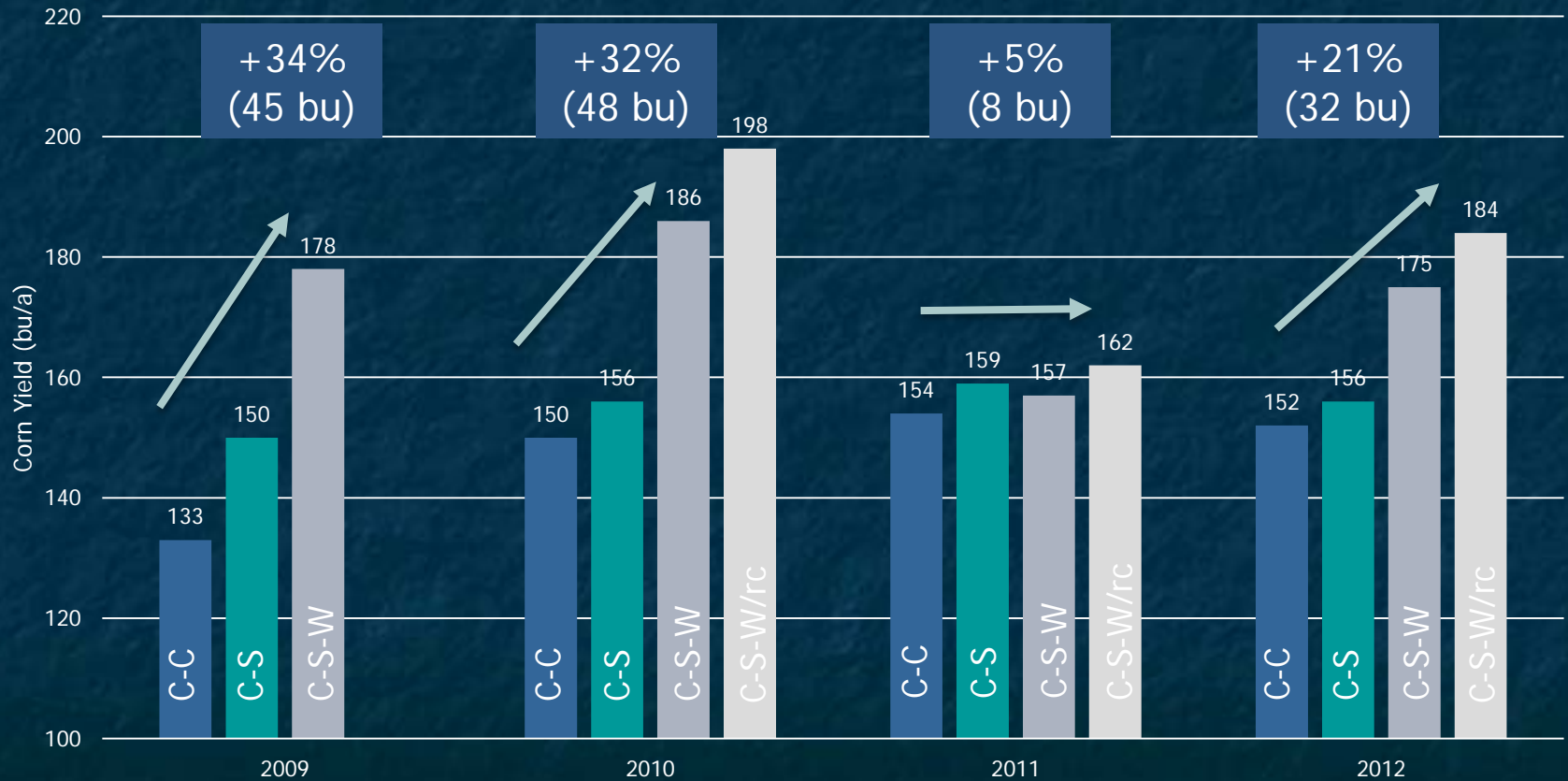
Objective: To determine the impact of wheat in the rotation

Gaudin, A. C. M., et al. (2015). "Wheat improves nitrogen use efficiency of maize and soybean-based cropping systems." *Agriculture, Ecosystems & Environment* **210**: 1-10.



# Rotation Effect - Corn

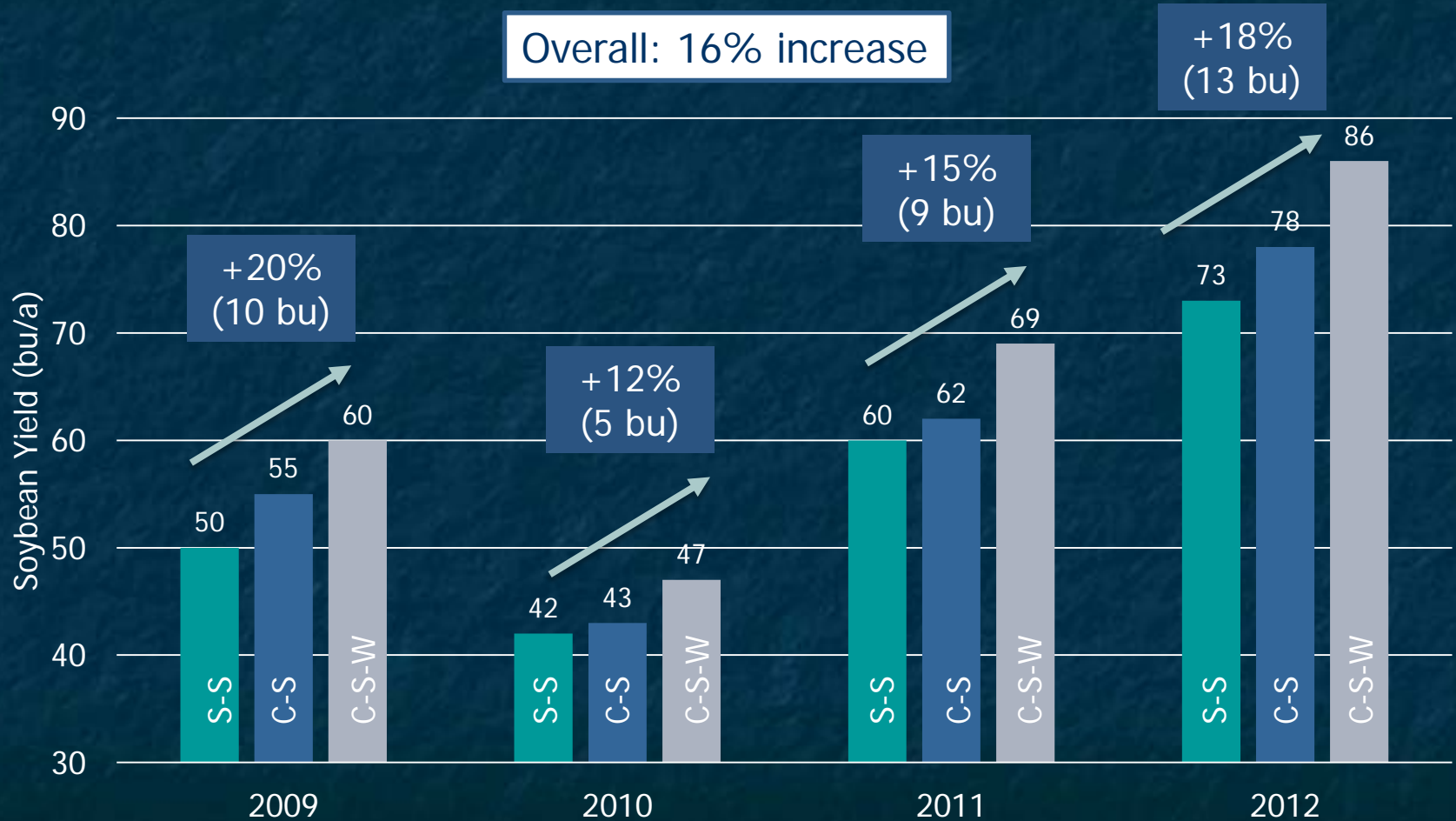
Overall: 23% increase



Gaudin, A. C. M., et al. (2015). "Wheat improves nitrogen use efficiency of maize and soybean-based cropping systems." *Agriculture, Ecosystems & Environment* **210**: 1-10.



# Rotation Effect - Soybean

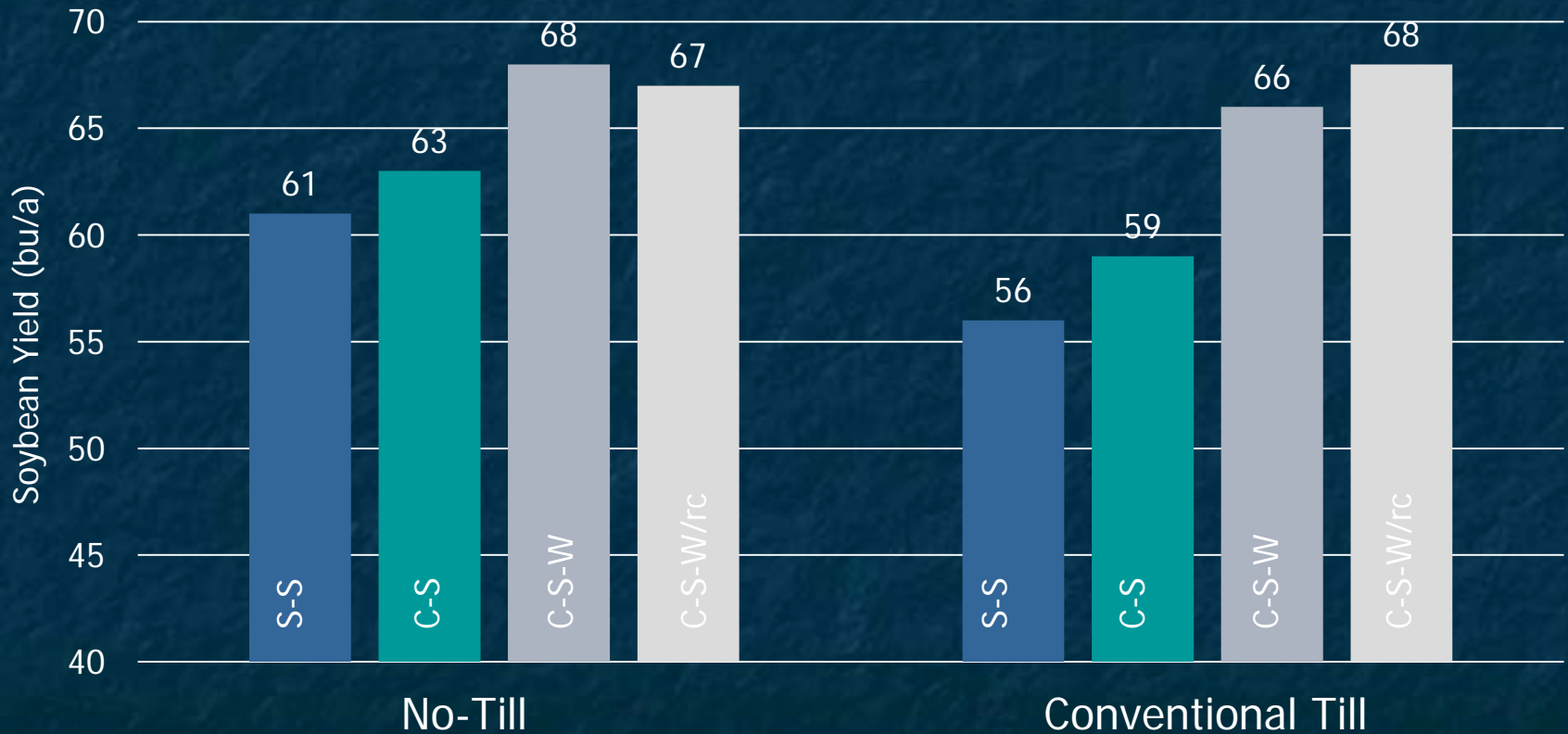


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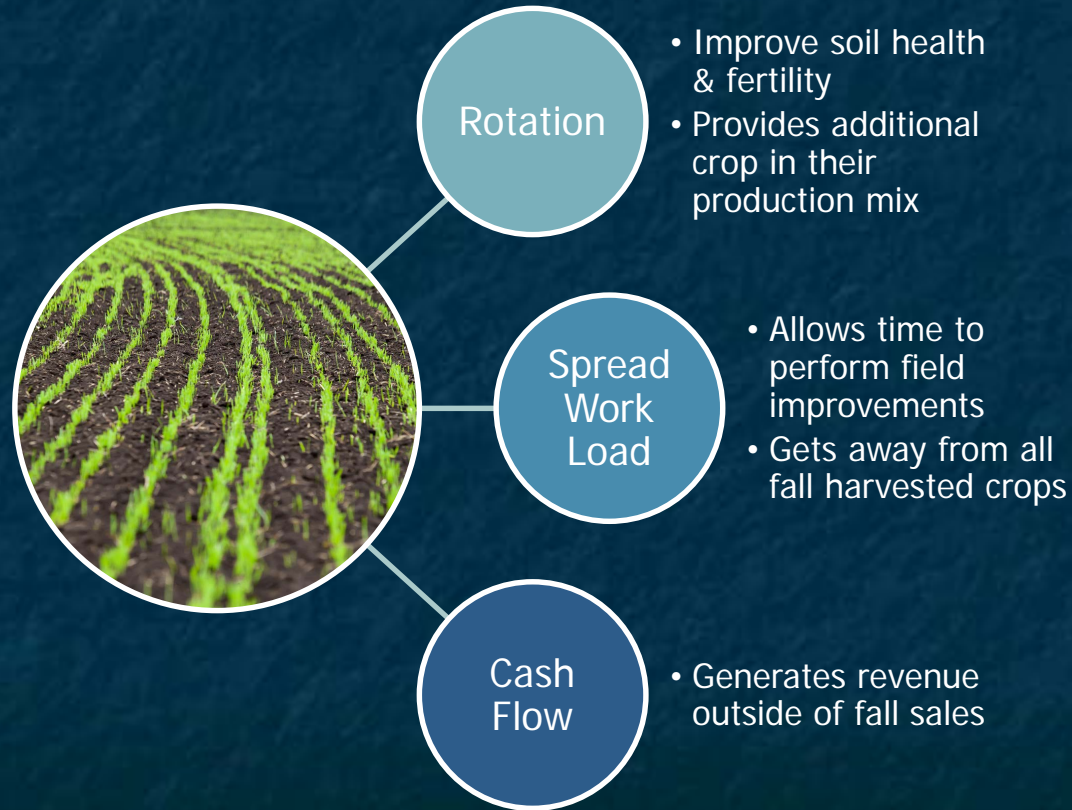


# Rotation Effect – Soybean w/rc

No significant decrease in yield



# Advantages for Producers to Plant Winter Wheat



Source: Jeff Kuehnlein, MAC, MABA Winter Meeting 2016.



# Fall Management



# Planting Dates

- Hession Fly Free Date: September 3-23
  - [http://msue.anr.msu.edu/news/planting\\_the\\_2015\\_winter\\_wheat\\_crop](http://msue.anr.msu.edu/news/planting_the_2015_winter_wheat_crop)
- Hasn't been any recent problems with BYDV, but should still use as a guide
- Target end of September/early October



# Planting Dates

- goal: 2 to 3 tillers by winter
- adds 1 bu per day (*relationship hold into late Oct.*)
- early soybean harvest?
- seeding rate: 1.4-1.6 mill (early)
- Late Oct: 1.8-2.1 mill seeds/a



# Seeding practices for uniform stand

- Consistent seed placement
  - Residue management
  - Drill operation/settings
  - Tillage?



# Variety Selection

- Use Multi-Year Performance Data

- Yield
- Test Weight
- Height
- Lodging
- Winter Hardiness
- Disease Scoring

<http://www.varietytrials.msu.edu/wheat>



# Seed Source

- Certified vs. Non-Certified
- % Germination
- Purity
- Free of foreign material (weed seed)
- 0% sprouting



# Seed Placement

- Prepare soil with minimum tillage (single pass with field cultivator)
- Avoid highly compacted fields
- Do **NOT** plant when fields are too wet
- 1-1.5 inches deep
- Only plant deeper in dry soils



# Seeding Rate

- Seeds/acre **not** Bushels/acre
- 1.6-2.1 million seeds per acre (22-29 seeds/foot for 7 inch rows)







# PARENT SEED

Crop and Variety MCIA RED DEVIL BRAND RED  
 Vendor MCIA  
 Address LANSING MI 48909  
 Lot No. P 15 2810 LMS  
 Purity 99.70 % Net Wt. 2000/907.2 Lbs./Kg  
 Inert 00.28 % Date 8/15  
 Weeds 00.01 % Germ. 90 %  
 Other Crop 00.01 % Seed Count 14996 /lb.  
 VARIETY NOT STATED  
 ORIGIN - MI (USA)

## MCIA INSPECTED

12

\*SEE DISCLAIMER OF WARRANTIES ON REVERSE



# QUALITY ASSURANCE

Crop and Variety RED WHEAT  
 MCIA RED DEVIL BRAND RED  
 Vendor METZ SEED FARM  
 Address TDA MI 48140  
 Lot No. Q 15 2810 LMS  
 Purity 99.70 % Net Wt. 2000/907.2 Lbs./Kg  
 Inert 00.28 % Date 8/15  
 Weeds 00.01 % Germ. 90 %  
 Other Crop 00.01 % Seed Count 15631 /lb.  
 VARIETY NOT STATED  
 ORIGIN MI (USA)

## MCIA INSPECTED

\*SEE DISCLAIMER OF WARRANTIES ON REVERSE

# FOUNDATION SEED



Crop and Variety SUNBURST RED WHEAT  
 Vendor MCIA  
 Address Lansing MI 48909  
 Lot No. F 15 2810 LM1  
 Purity 99.70 % Net Wt. 2000/907.2 Lbs./Kg.  
 Inert 00.29 % Date 8/15  
 Weeds 00.00 % Germ. 90 %  
 Other Crop 00.01 % Seed Count 11948 /lb.  
 PVP A94 MAY BE SOLD ONLY  
 CLASS OF CERTIFIED SEED

1

MEMBER OF ASSOCIATION OF OFFICIAL SEED CERTIFYING AGENCIES



# Example

## Red Devil

- Target: 1.8 million
- 14,996 seeds/pound
- Calibrate drill to plant:  
 $1,800,000 \div 14,996$   
 $= 120.0 \div 90\%$   
germ = 133 lbs/a

## Sunburst

- Target: 1.8 million
- 11,948 seeds/pound
- Calibrate drill to plant:  
 $1,800,000 \div 11,948$   
 $= 150.7 \div 90\%$   
germ = 167 lb/a



# Fall Fertility

- Soil Test
  - pH
  - P
  - K
  - Mn in some areas
- Fall fertilizer
  - up to 25 lbs of actual N
  - P and K according to soil test
  - pH amendments as indicated by test



# Weed Control

- Control all annuals and perennials prior to planting
- Optimum wheat stands may mean there's no need for chemical control
- Apply chemicals at proper time at low rates



# Spring/Summer Management

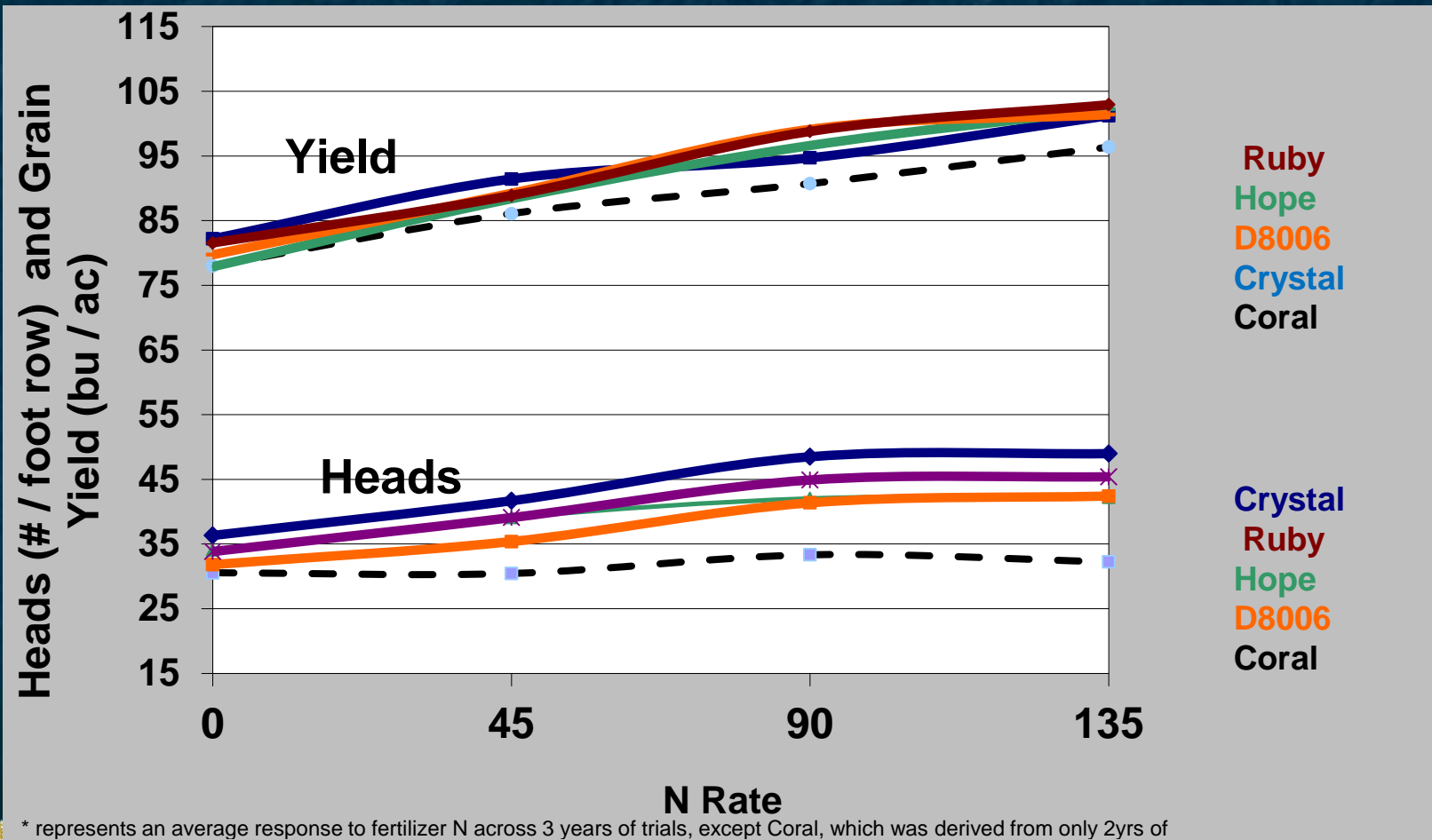


# Nitrogen Recommendation

- MSU rec'd:
  - $N = (1.33 \times \text{yield potential}) - 13$
- if use 20 lbs in fall:
  - for 80 bu., need 73 lbs N
  - for 100 bu., need 100 lbs N
- If use little or no N in Fall, 1.1 lb N / bu of YP may be reasonable



# Grain yield and head number in response to fertilizer N rate\* 2008-2010



\* represents an average response to fertilizer N across 3 years of trials, except Coral, which was derived from only 2yrs of

# Fungicides

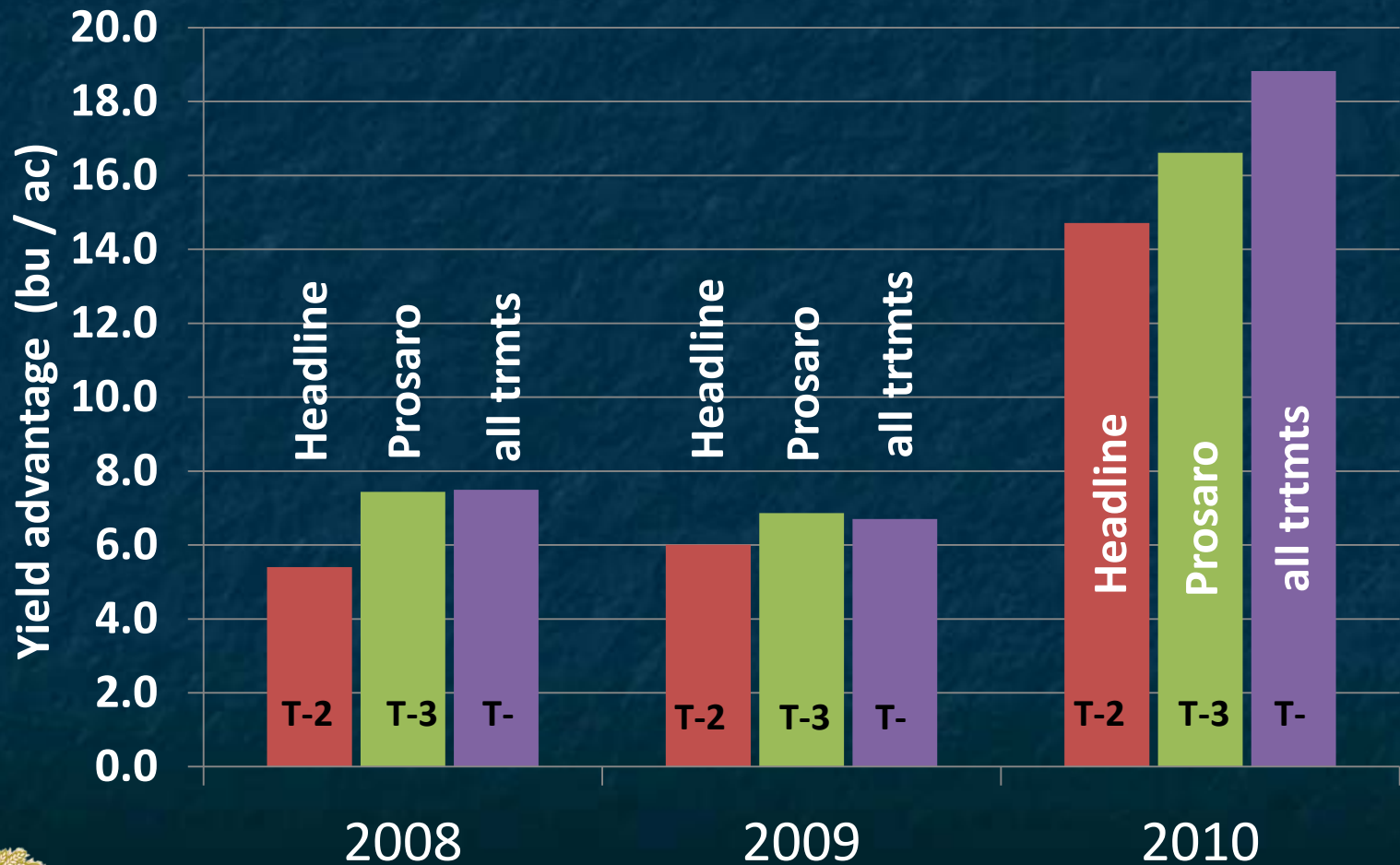
- Reduces leaf disease & increases yield (always)
  - extent depends on weather, yield potential, & variety
- Reduced risk of Head scab
  - using Caramba or Prosaro at anthesis (flowering)
  - maybe Tebuconazole





# Fungicide response depends on fungicide(s), application timing, & disease levels

Average yield response from fungicide use across five varieties, 2008-2010



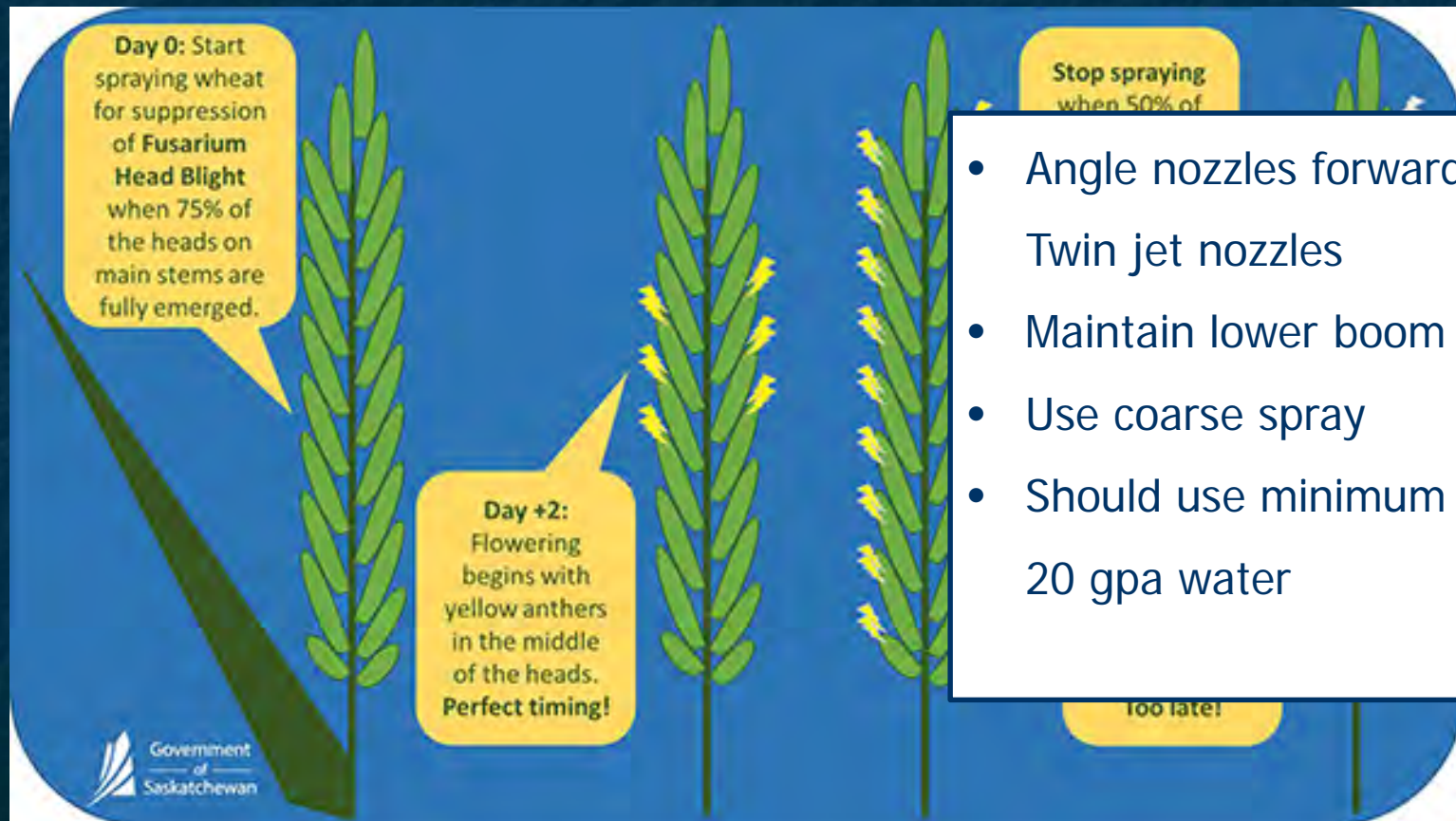
# Head scab management trials



Dr. Marty Chilvers



# Fusarium Head Blight (Scab)



- Angle nozzles forward or use Twin jet nozzles
- Maintain lower boom height
- Use coarse spray
- Should use minimum of 10-20 gpa water

Source: <http://www.agriculture.gov.sk.ca/fusarium-head-blight>



# Head scab management trial

## 4 SWWW varieties:

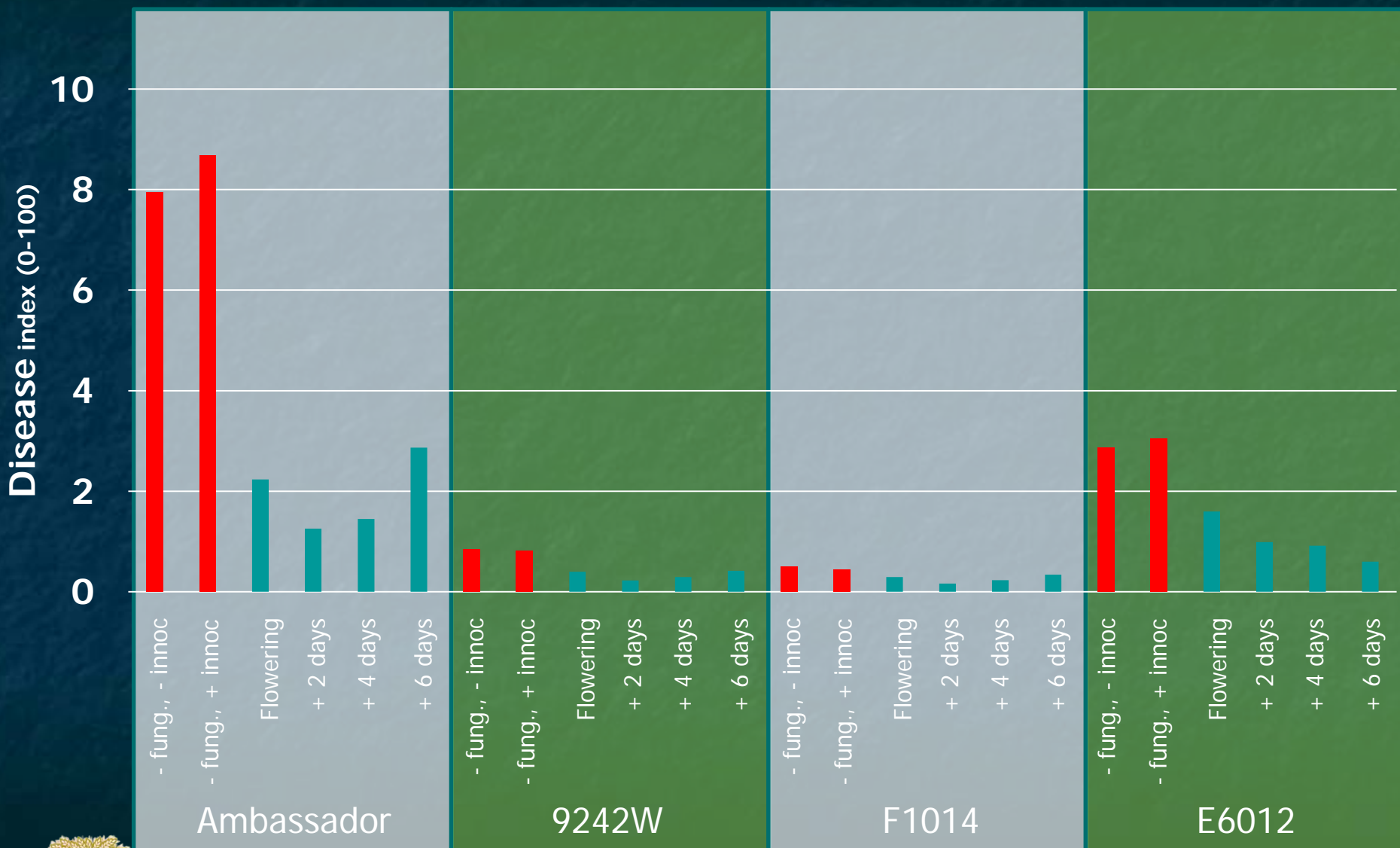
- Ambassador – susceptible check
- DynaGro 9242W – partially resistant check
- F1014 (line from Dr. Olsen's program)
- E6012 (line from Dr. Olsen's program)

## 6 Prosaro fungicide timing treatments:

- Non-sprayed, non-inoculated check
  - Inoculated, non-sprayed check
  - Fungicide at flowering (Feekes 10.5.1)
  - Fungicide 2 days post flowering
  - Fungicide 4 days post flowering
  - Fungicide 6 days post flowering
- Planted 10/17/2014
  - 90 lbs N/A applied at green up
  - 31.24 g of colonized sorghum applied on both 14 & 26 May 2015



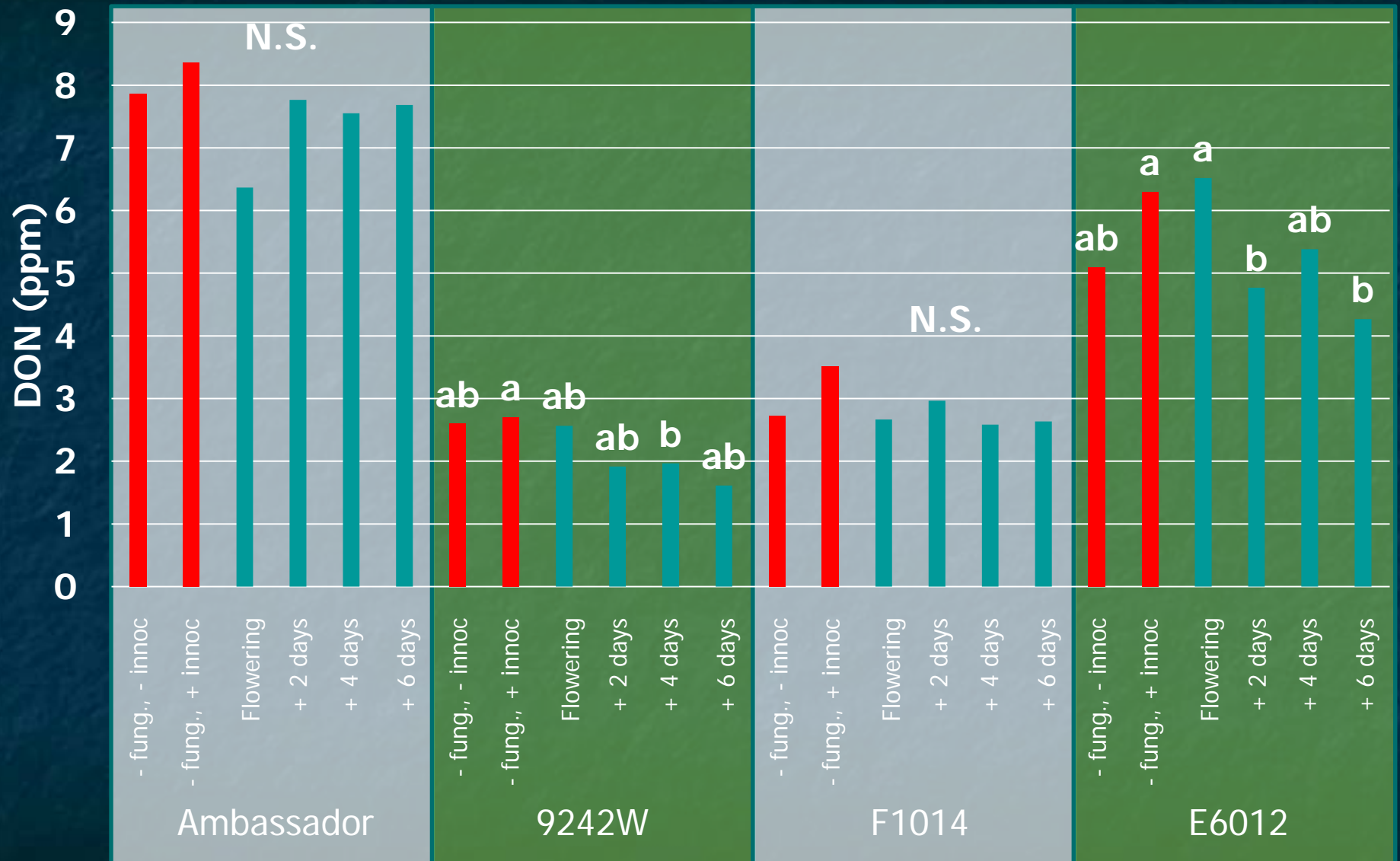
# Head Scab disease index (0-100)



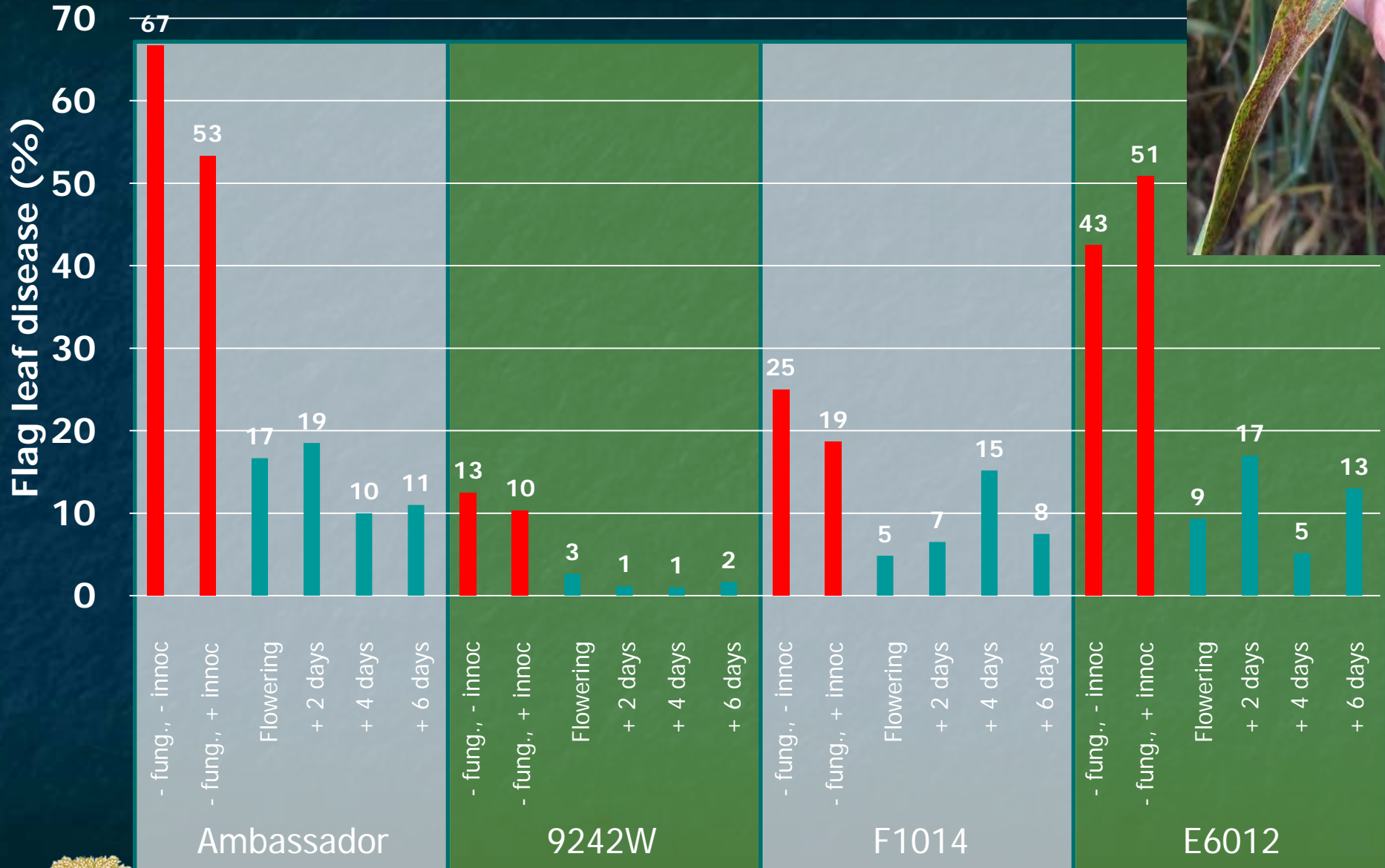
Chilvers et al. 2016



# DON (vomitoxin) (ppm)



# Flag leaf disease (%)



Chilvers et al. 2016



# Yield (bu/A)





# Fungicide profitability

*depends on level of response*

Wheat Price	\$5.00	\$5.00	\$5.00
Response (bu/a)	<b>4 bu</b>	<b>7 bu</b>	<b>10 bu</b>
Net Income	\$20.00	\$35.00	\$50.00
Prosaro/Caramba	\$15.00	\$15.00	\$15.00
NIS	\$0.50	\$0.50	\$0.50
Application	<u>\$7.00</u>	<u>\$7.00</u>	<u>\$7.00</u>
Total Cost	\$22.50	\$22.50	\$22.50
Net Profit	<b>-\$2.50</b>	<b>\$12.50</b>	<b>\$27.50</b>



# Fungicide profitability

*depends on grain price*

Wheat Price	\$5.00	\$6.00	\$7.00
Response :	<b>5 bu</b>	<b>5 bu</b>	<b>5 bu</b>
Net Income	\$25.00	\$30.00	\$35.00
Prosaro/Caramba	\$15.00	\$15.00	\$15.00
NIS	\$0.50	\$0.50	\$0.50
Application	<u>\$7.00</u>	<u>\$7.00</u>	<u>\$7.00</u>
Total Cost	\$22.50	\$22.50	\$22.50
Net Profit	<b>\$2.25</b>	<b>\$7.50</b>	<b>\$12.50</b>



# Fungicide profitability

*depends on traffic loss*

Wheat Price	\$5.00	\$5.00	\$5.00
Response (bu/a)	4	7	10
Net Income	\$20.00	\$35.00	\$50.00
Prosaro/Caramba	\$15.00	\$15.00	\$15.00
NIS	\$0.50	\$0.50	\$0.50
Application	\$7.00	\$7.00	\$7.00
Total Cost	\$22.50	\$22.50	\$22.50
Net Profit	-\$2.50	\$12.50	\$27.50
Traffic loss (1.5 bu/a)	\$7.50	\$7.50	\$7.50
Net after traffic	-\$10.00	\$5.00	\$20.00



# Efficacy of fungicides

- No strobilurin – can increase DON

<i>Fungicide(s)</i>			Powde	Leaf/g	Septori	Strip	Leaf	Stem	Hea	Harvest
Active ingredient	Product	Rate/A	ry	lume	a leaf	e rust	rust	rust <sup>4</sup>	d	Restrict
		(fl. oz)	milde	blotch	spot				scab	.
Metconazole 8.6%	Caramba 0.75 SL	10.0 - 17.0	VG <sup>1</sup>	VG	VG	E	E	E	G	30 days
Prothioconazole 41%	Proline 480 SC	5.0 - 5.7	-- <sup>2</sup>	VG	VG	VG	VG	VG	G	30 days
tebuconazole 38.7%	various <sup>3</sup>	4.0	G	VG	VG	E	E	E	F	30 days
Prothioconazole1 9% plus Tebuconazole 19%	Prosaro 421 SC	6.5 - 8.2	G	VG	VG	E	E	E	G	30 days



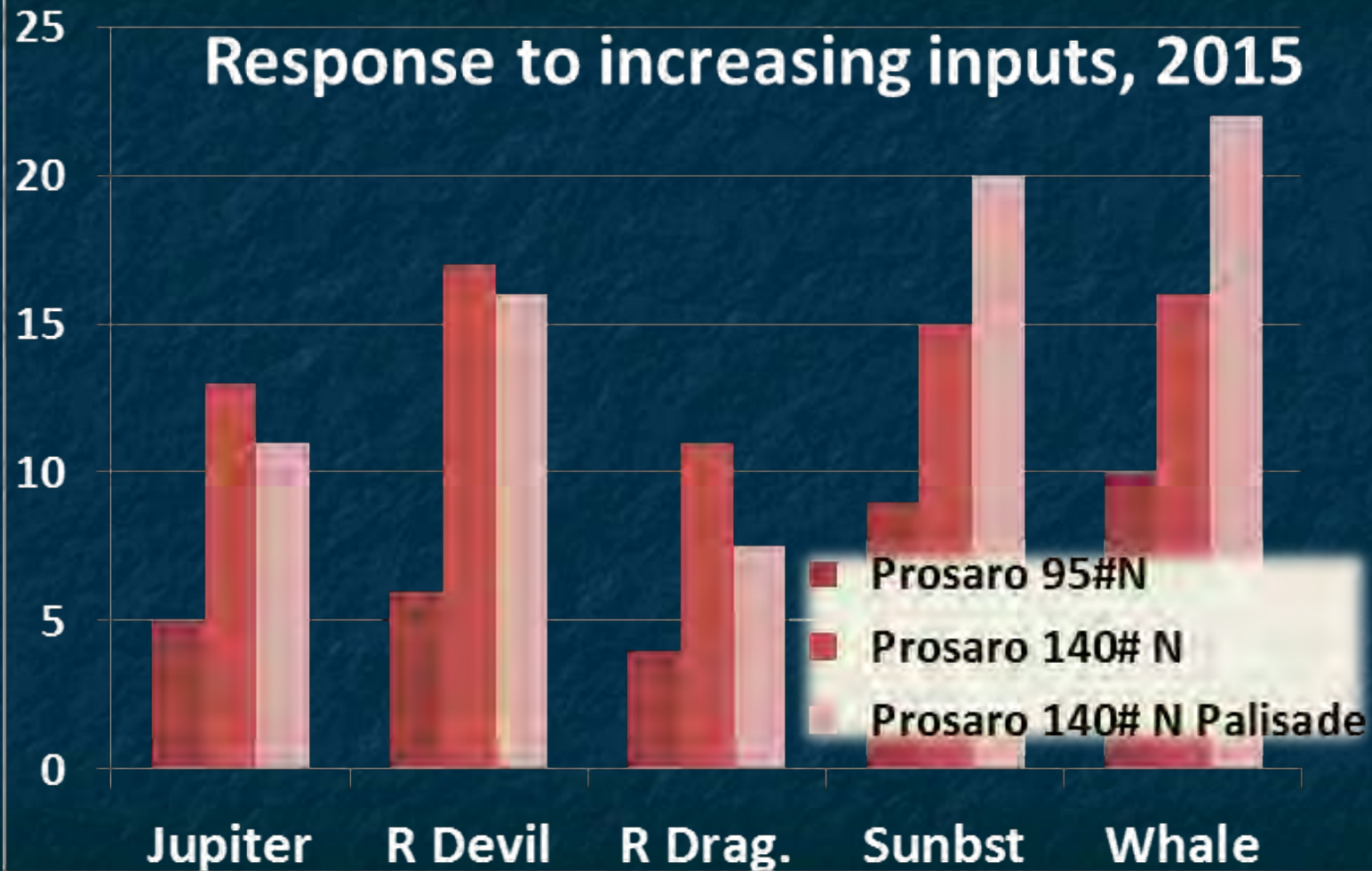
## 2015 Trial:

Response to increasing  
inputs on selected  
wheat varieties

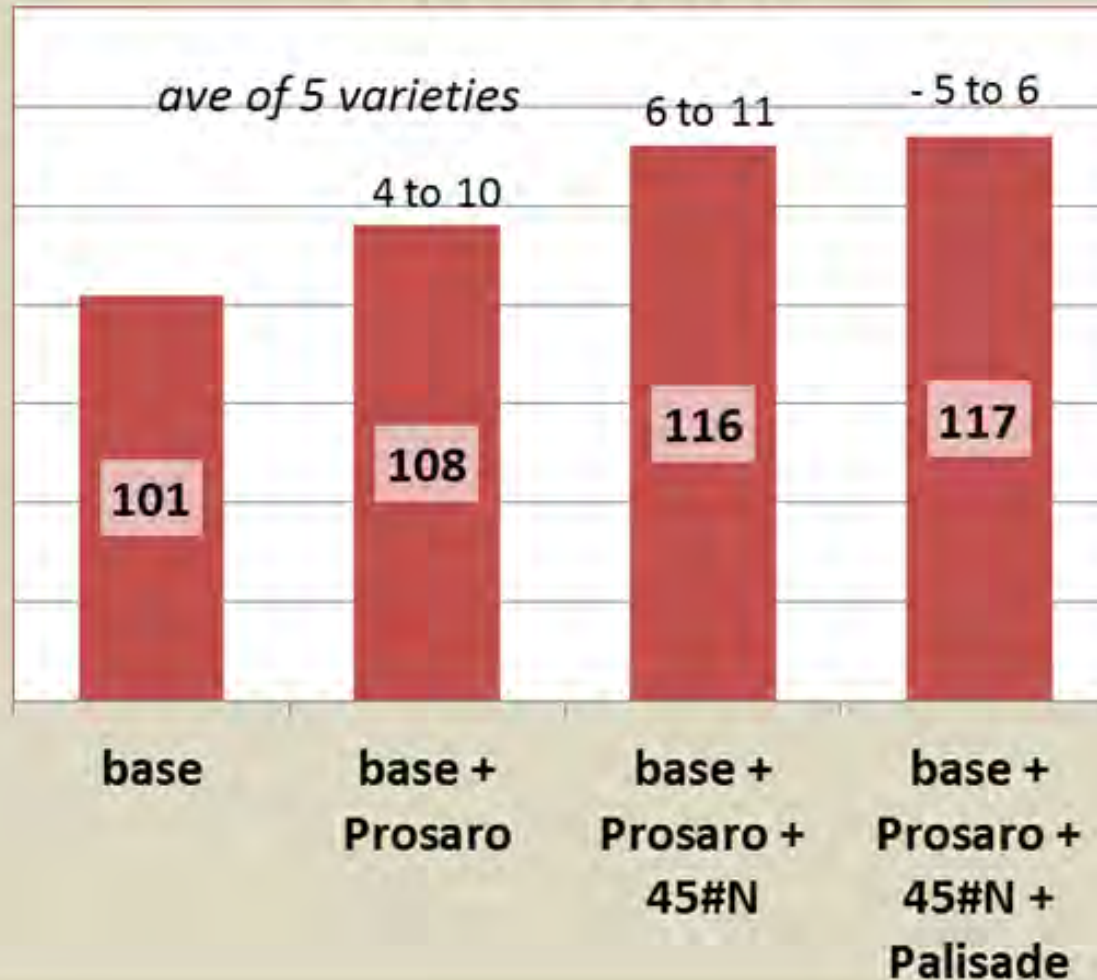
*A trial conducted in concert  
with MCIA*



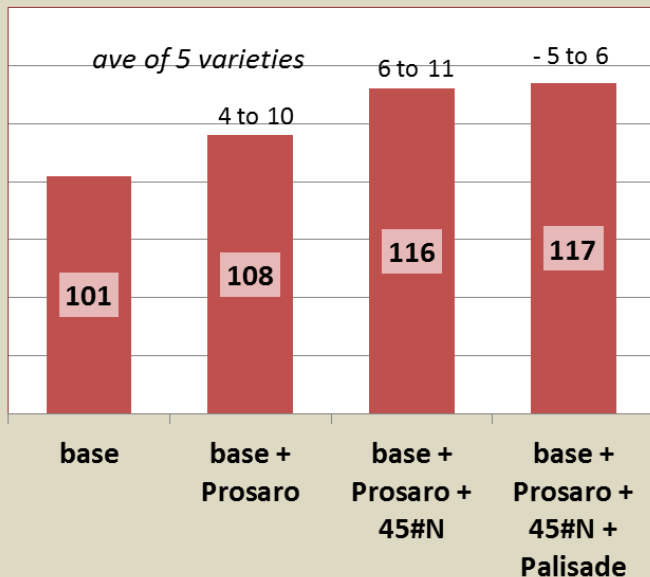
# Response to increasing inputs, 2015



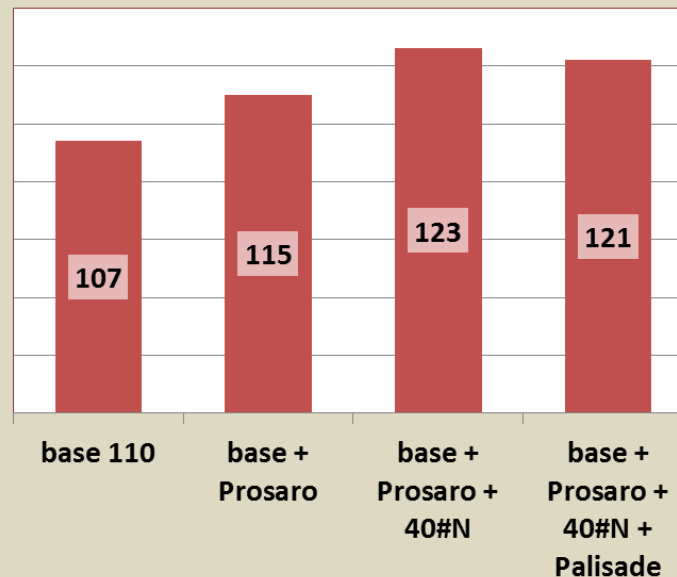
## Response to increasing inputs - Deckerville, 2015



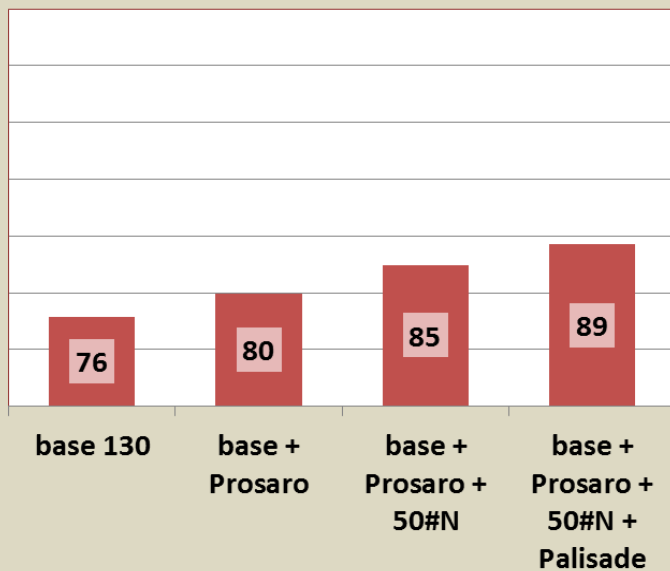
### Response to increasing inputs - Deckerville, 2015



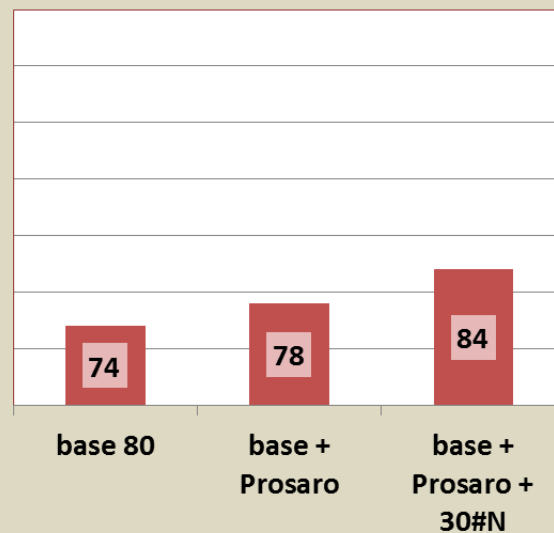
### Response to increasing inputs - Kingston, 2015



### Response of increasing input - Monroe, 2015



### Response to increasing inputs - Hillman, 2015





# Cost of Production

- Poll 2



# Cost of Production

## Variable cash

- Seed, fertilizer, chemicals, trucking, drying, repairs, supplies, marketing, fuel, storage

## Land Cost + Draw

- Rent, prop taxes, draw

## Fixed cash

- Insurance, labor, interest

## Other

- Depreciation, Return to capital & management



Microsoft Excel  
Worksheet



# Cost of Production

	Corn	Wheat	Soybean
Yield (bu/a)	190	90	60
Price (\$/bu)	\$3.25	\$5.00	\$8.50
Gov. Program (\$/a)	\$15.00	\$15.00	\$15.00
Income (\$/a)	\$632.50	\$465.00	\$525.00



# Cost of Production

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Gov. Program (\$/a)	\$15.00	\$15.00	\$15.00
Income (\$/a)	\$632.50	\$465.00	\$525.00
Var. Cash (\$/a)	\$427.32	\$214.44	\$240.97
Land Cost + Draw (\$/a)	\$175.00	\$175.00	\$175.00
Fixed Cash (\$/a)	\$40.37	\$23.72	\$24.30
Depr./return to mngmt	\$47.00	\$47.00	\$47.00
Total Expense (\$/a)	\$689.69	\$460.16	\$487.27



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Depr./return to mngmt	\$47.00	\$47.00	\$47.00
Total Expense (\$/a)	\$689.69	\$460.16	\$487.27
Return per acre	<b>-\$57.19</b>	<b>\$4.84</b>	<b>\$37.73</b>
Breakeven yield	207	89	56
Breakeven price	\$3.63	\$5.11	\$8.12



# Cost of Production

- What about different management?
- Lower productivity
- Lower land rent
- Two scenarios:
  - 75 bu yield/\$90 rent
  - 120 bu yield/\$225 rent
- Variables changed
  - Nitrogen
  - Phosphorus
  - Potash
  - Fungicide
  - Fuel & Lube
  - Marketing
  - Trucking
  - Rent



# Cost of Production

	Base
Nitrogen	\$42.00
Phosphorus	\$27.50
Potash	\$17.00
Fungicide	\$22.50
Fuel & Lube	\$6.06
Marketing (\$0.05/bu)	\$4.50
Trucking (\$0.15/bu)	\$11.48
Rent	\$150.00
Total	\$281.04



# Cost of Production

	Base	75 bu/a
Nitrogen	\$42.00	\$31.50
Phosphorus	\$27.50	\$22.50
Potash	\$17.00	\$15.30
Fungicide	\$22.50	\$22.50
Fuel & Lube	\$6.06	\$5.03
Marketing (\$0.05/bu)	\$4.50	\$3.75
Trucking (\$0.15/bu)	\$11.48	\$9.56
Rent	\$150.00	\$90.00
Total	\$281.04	\$200.14





# Cost of Production

	Base	75 bu/a	120 bu/a
Nitrogen	\$42.00	\$31.50	\$63.00
Phosphorus	\$27.50	\$22.50	\$35.00
Potash	\$17.00	\$15.30	\$20.40
Fungicide	\$22.50	\$22.50	\$45.00
Fuel & Lube	\$6.06	\$5.03	\$8.05
Marketing (\$0.05/bu)	\$4.50	\$3.75	\$6.00
Trucking (\$0.15/bu)	\$11.48	\$9.56	\$15.30
Rent	\$150.00	\$90.00	\$225.00
Total	\$281.04	\$200.14	\$417.75



# Cost of Production

	Base	75 bu/a	120 bu/a
Yield (bu/a)	90	75	120
Price (\$/bu)	\$5.00	\$4.85	\$4.85
Gov. Program (\$/a)	\$15.00	\$15.00	\$15.00
Income (\$/a)	\$465.00	\$378.75	\$597.00



# Cost of Production

	Base	75 bu/a	120 bu/a
Yield (bu/a)	90	75	120
Price (\$/bu)	\$5.00	\$4.85	\$4.85
Gov. Program (\$/a)	\$15.00	\$15.00	\$15.00
Income (\$/a)	\$465.00	\$378.75	\$597.00
Var. Cash (\$/a)	\$214.44	\$193.57	\$276.18
Land Cost + Draw (\$/a)	\$175.00	\$115.00	\$250.00
Fixed Cash (\$/a)	\$23.72	\$21.93	\$26.06
Depr./return to mngmt	\$47.00	\$47.00	\$47.00
Total Expense (\$/a)	\$460.16	\$377.50	\$599.24



# Cost of Production

	Base	75 bu/a	120 bu/a
Yield (bu/a)	90	75	120
Price (\$/bu)	\$5.00	\$4.85	\$4.85
Gov. Program (\$/a)	\$15.00	\$15.00	\$15.00
Income (\$/a)	\$465.00	\$378.75	\$597.00
Var. Cash (\$/a)	\$214.44	\$193.57	\$276.18
Land Cost + Draw (\$/a)	\$175.00	\$115.00	\$250.00
Fixed Cash (\$/a)	\$23.72	\$21.93	\$26.06
Depr./return to mngmt	\$47.00	\$47.00	\$47.00
Total Expense (\$/a)	\$460.16	\$377.50	\$599.24
Return per acre	<b>\$4.84</b>	<b>\$1.25</b>	<b>-\$2.24</b>
Breakeven yield	89.1	74.8	120.5
Breakeven price	\$5.11	\$5.03	\$4.99



# Poll 3



# Questions? Discussion?

Dennis Pennington

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