

Enhancing Yield of Wheat and Oat

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Cereal Yields are Increasing, but have not kept pace with Oilseeds and Pulses

- *Yield potential of varieties*
- *Lodging*
- *Diseases*



How do we increase yield?

- Genetic improvement increases yield potential
- Improved crop protection prevents yield loss
- Improved management (eg. Fertilizer and seeding practices) helps crop to reach their full yield potential



Disease Management

- Cereals
 - Leaf diseases on Oat and Wheat
 - Fusarium on Wheat



Fungicide Response by Oat: 4 Trials at IHARF and NARF sites in 2012 and 2013

- Very little disease = No Fungicide response
 - Triactor has good disease resistance
- Some growers have seen good responses
 - AC Morgan with poorer disease resistance
 - Late seeding may get Crown Rust

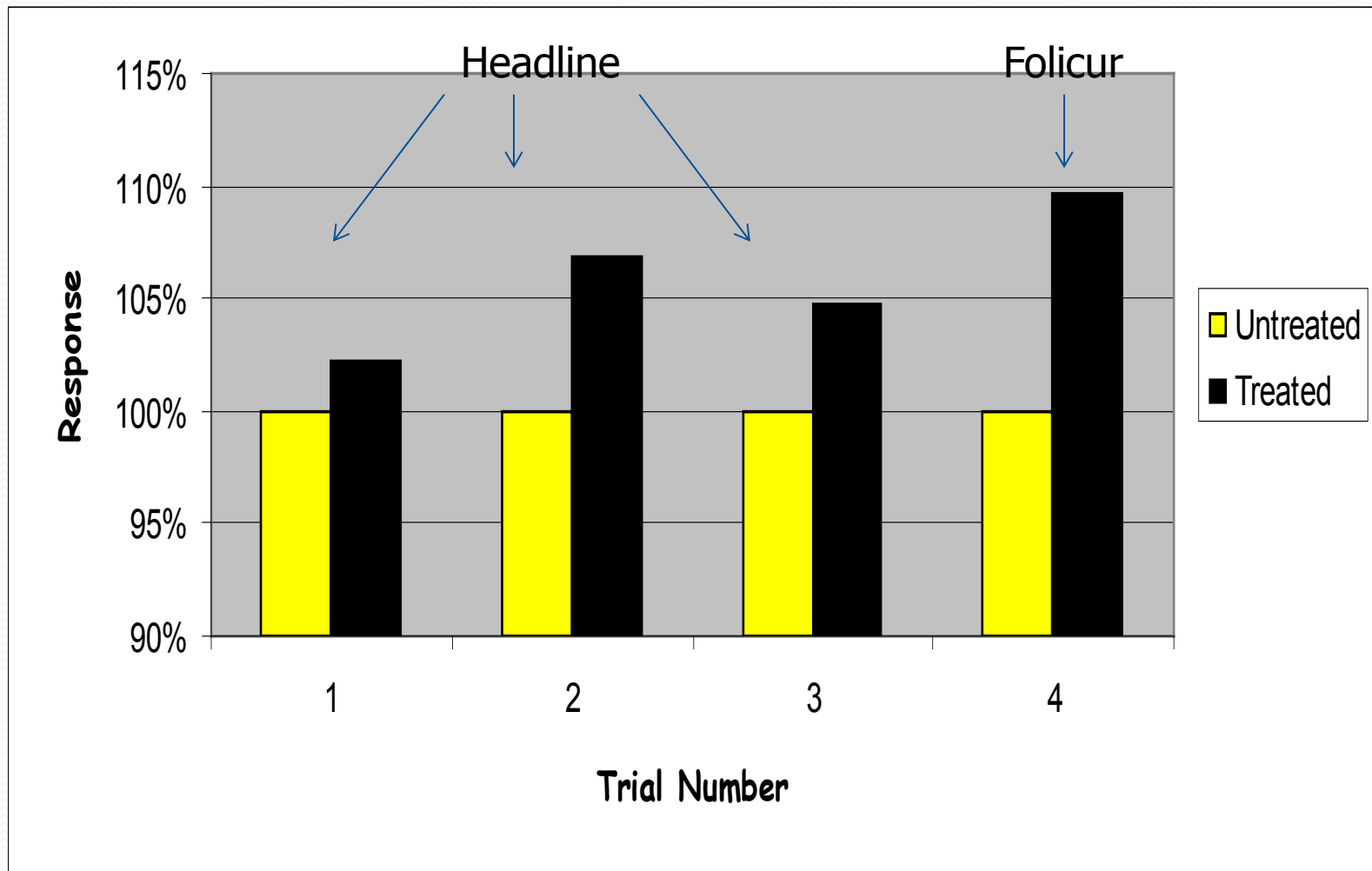


Input Supplier Oat Fungicide Trials near Tisdale (not NARF)

- 3 Headline, 1 Folicur in 2009
- Applied early heading
- Strip trials in farmer fields, repeated 2 X
- Low to moderate disease pressure

Oat Yield Response

Untreated = 158 bu/ac, Treated = 169 bu/ac a 7% increase

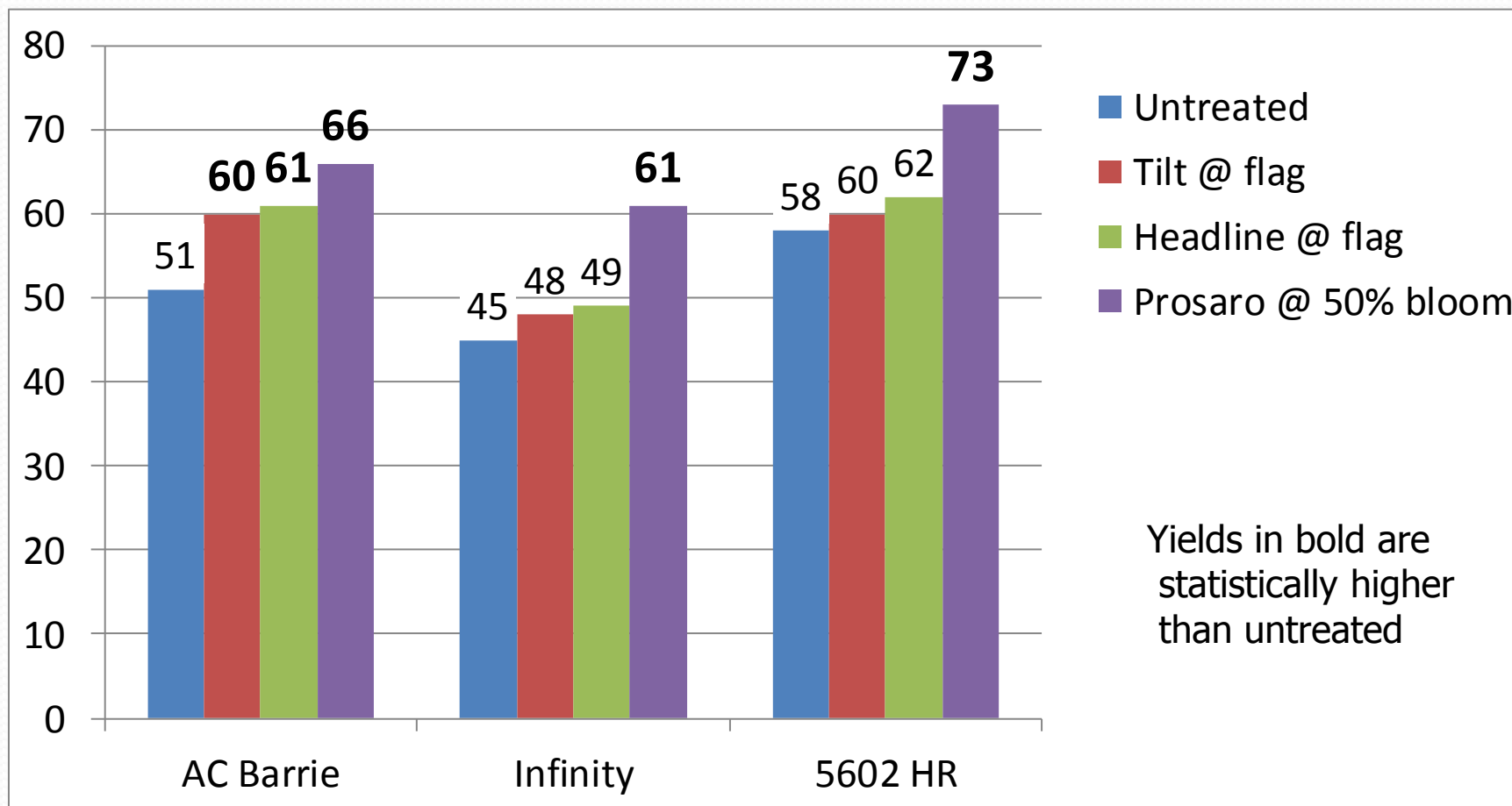


Fungicides for Wheat 2009-2011

applied at flag leaf stage

Variety	Untreated	Tilt	Headline
AC Barrie	58	70*	72*
Infinity	67	73*	75*
2011 6503 HR	73	76	78

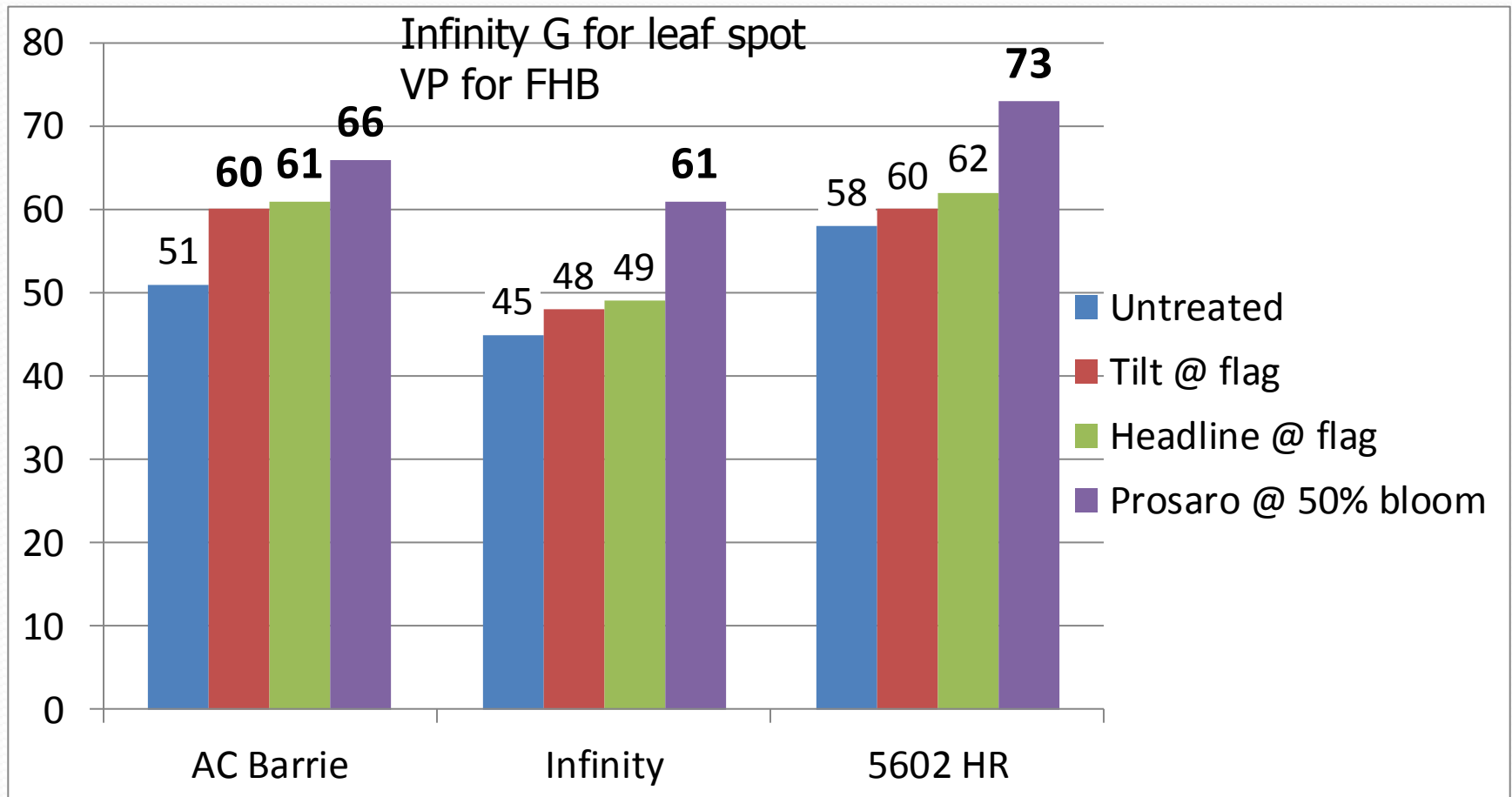
Fungicides for Wheat 2012 (bu/ac)



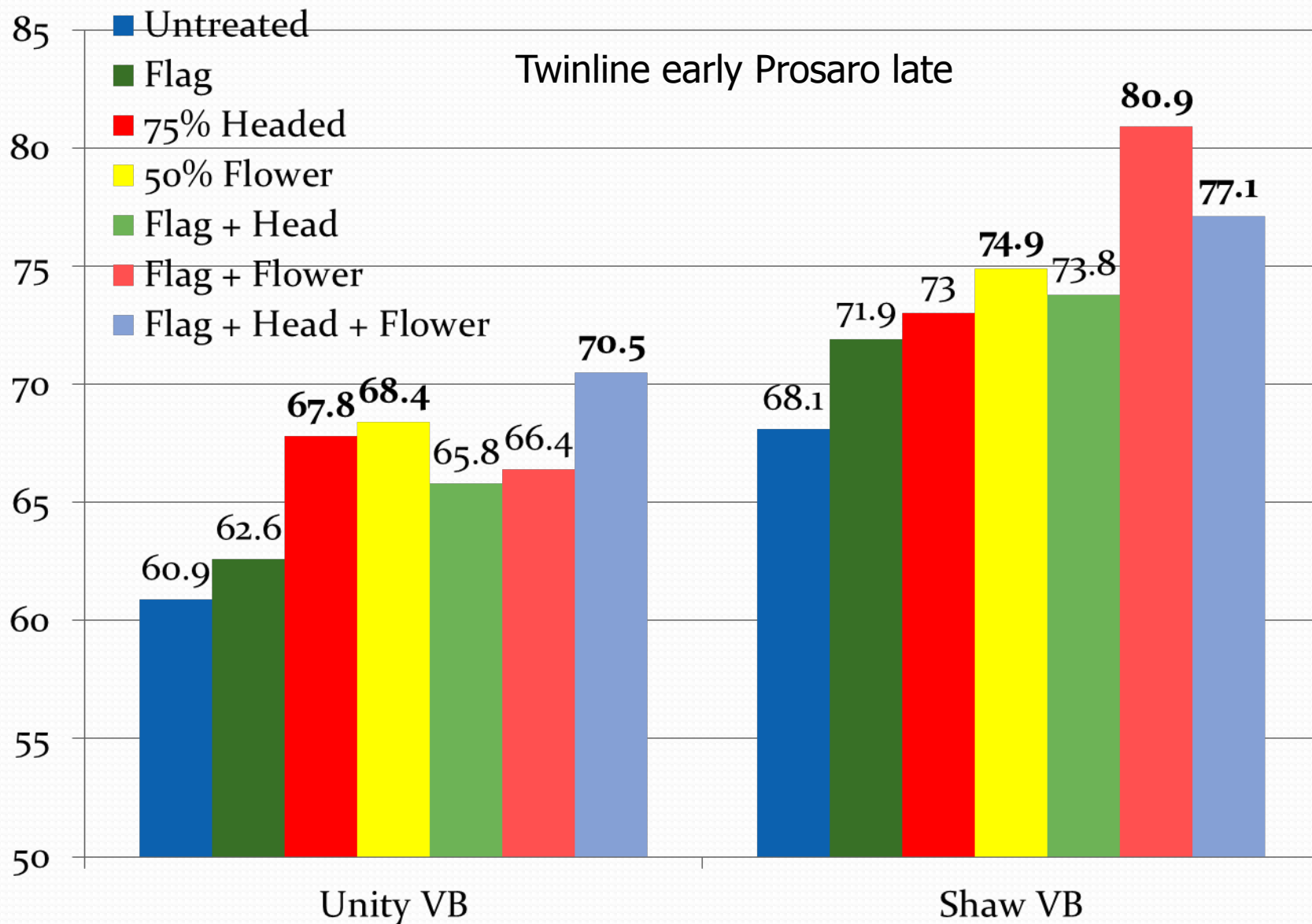
Fungicides for Wheat 2012 (bu/ac)

AC Barrie P leaf spot
F for FHB

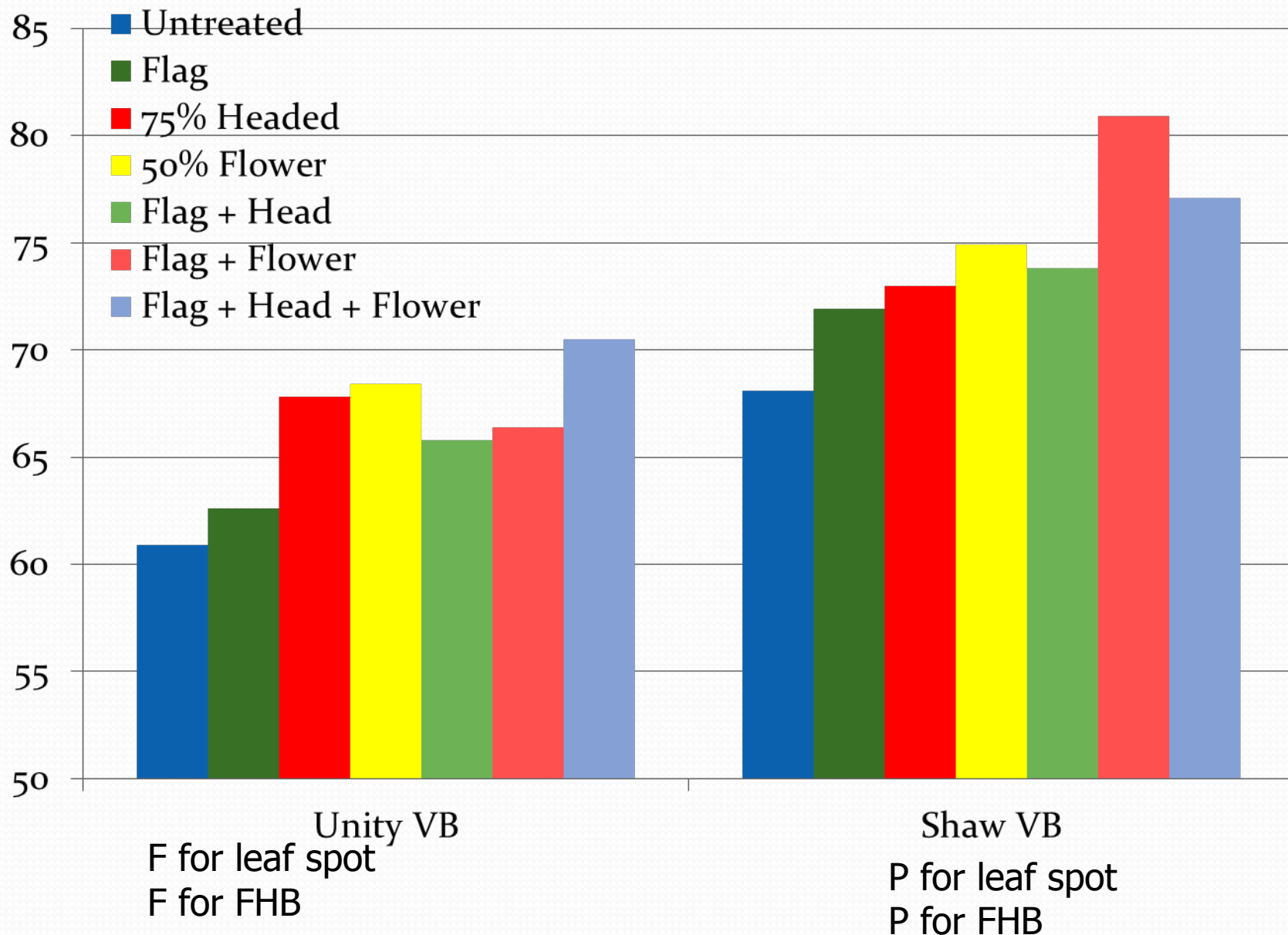
5602 HR G for leaf spot
F for FHB



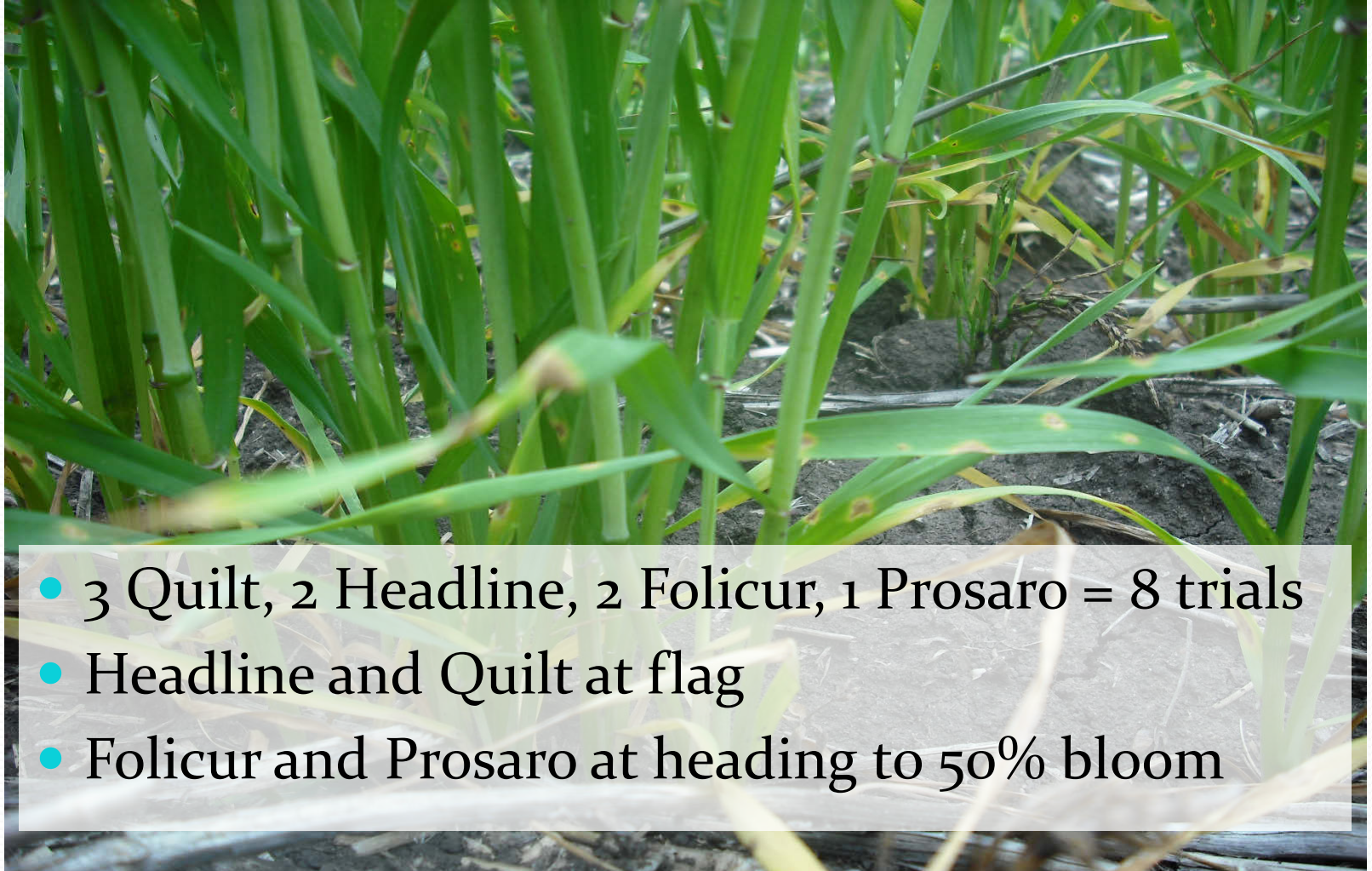
Fungicide Timing on Wheat 2013



Fungicide Timing on Wheat 2013



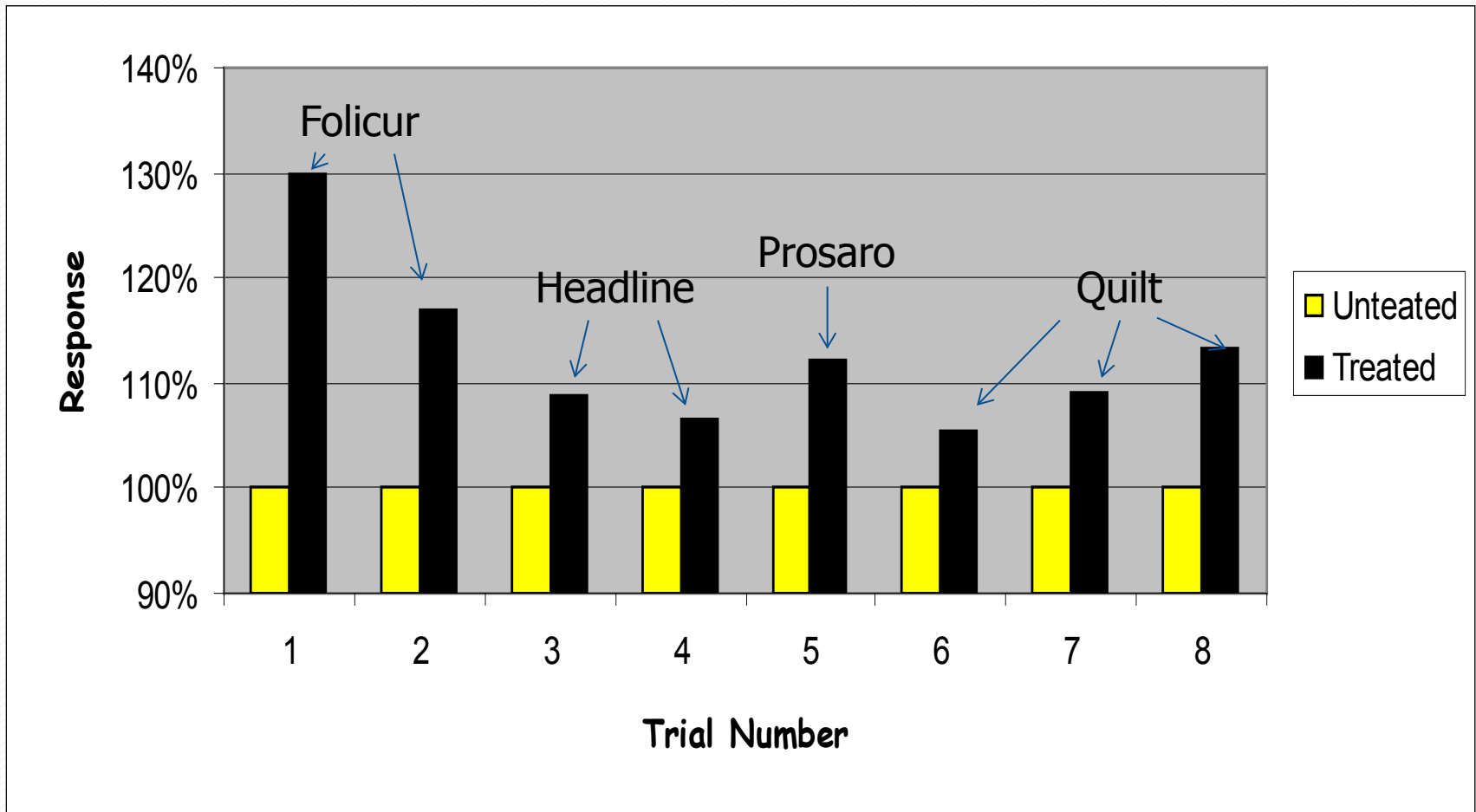
Input Supplier Wheat Fungicide Trials near Tisdale (not NARF)



- 3 Quilt, 2 Headline, 2 Folicur, 1 Prosaro = 8 trials
- Headline and Quilt at flag
- Folicur and Prosaro at heading to 50% bloom

Wheat Yield Responses

Untreated = 51 bu/ac; Treated = 57 bu/ac



Summary; Wheat Diseases

- Critical to know what diseases to target
- Fusarium a bigger yield robber than leaf diseases in 2012 and 2013.
- Do optimum timings differ between varieties?
- Difficult to justify 2 applications.



Summary; Wheat Diseases

- Use resistant variety for leaf disease and fungicides for fusarium.
- Start applications at 75% head emergence so can finish by 50% flower?



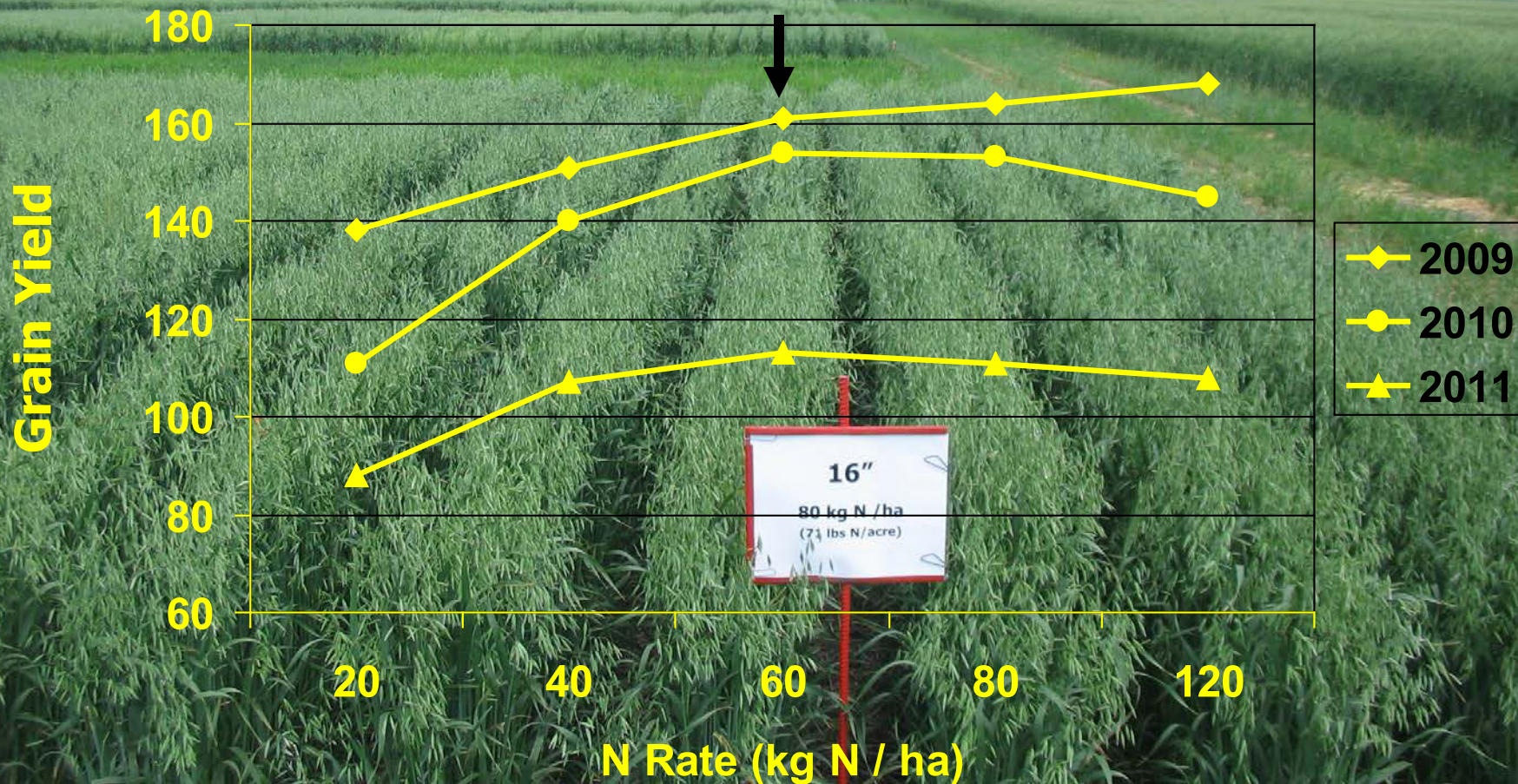
Fertilizer Management

- Oat and Wheat N Responses

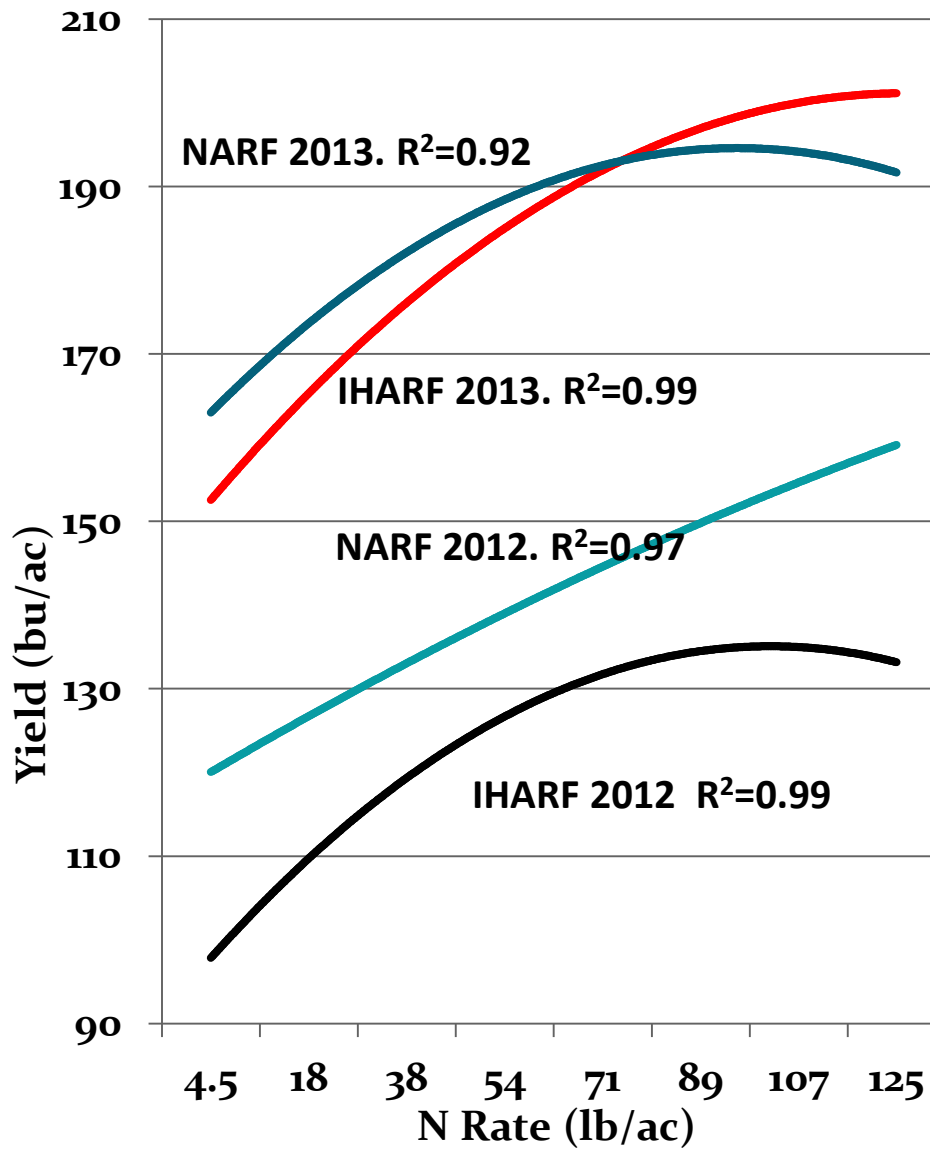


Optimum N Rates at IH, 2009-11

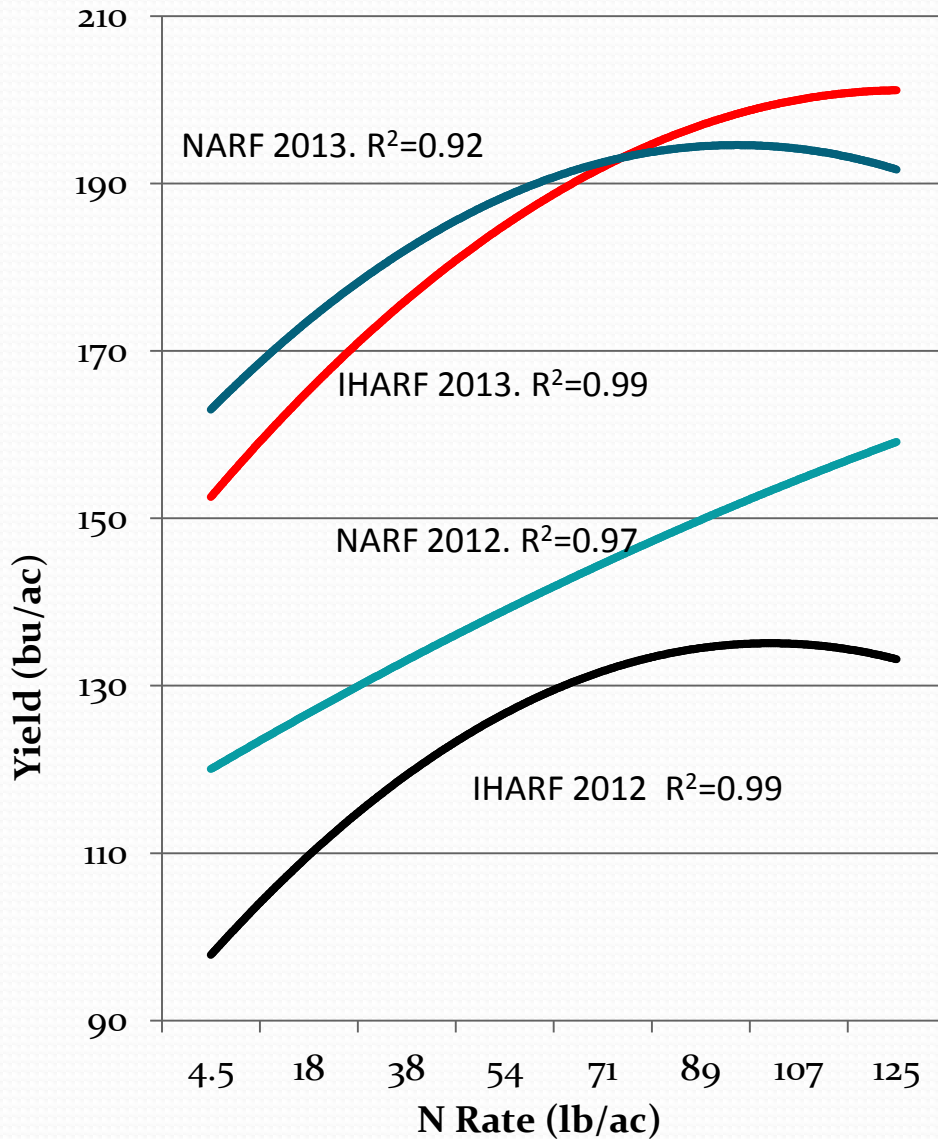
~Optimum N Rate @ 60 kg N/ha



Oat Yield Response to N at IHARF and NARF in 2012 & 2013



Oat Yield Response to N at IHARF and NARF in 2012 & 2013



After a series of years of favorable moisture and high yield, optimum N rates have increased, from 60lb/ac in 2009-11 to 80 or 100+ Lb/ac in 2012-13

Soil fertility levels appear to change over time, increasing when yields are low and decreasing in high yield cycles.

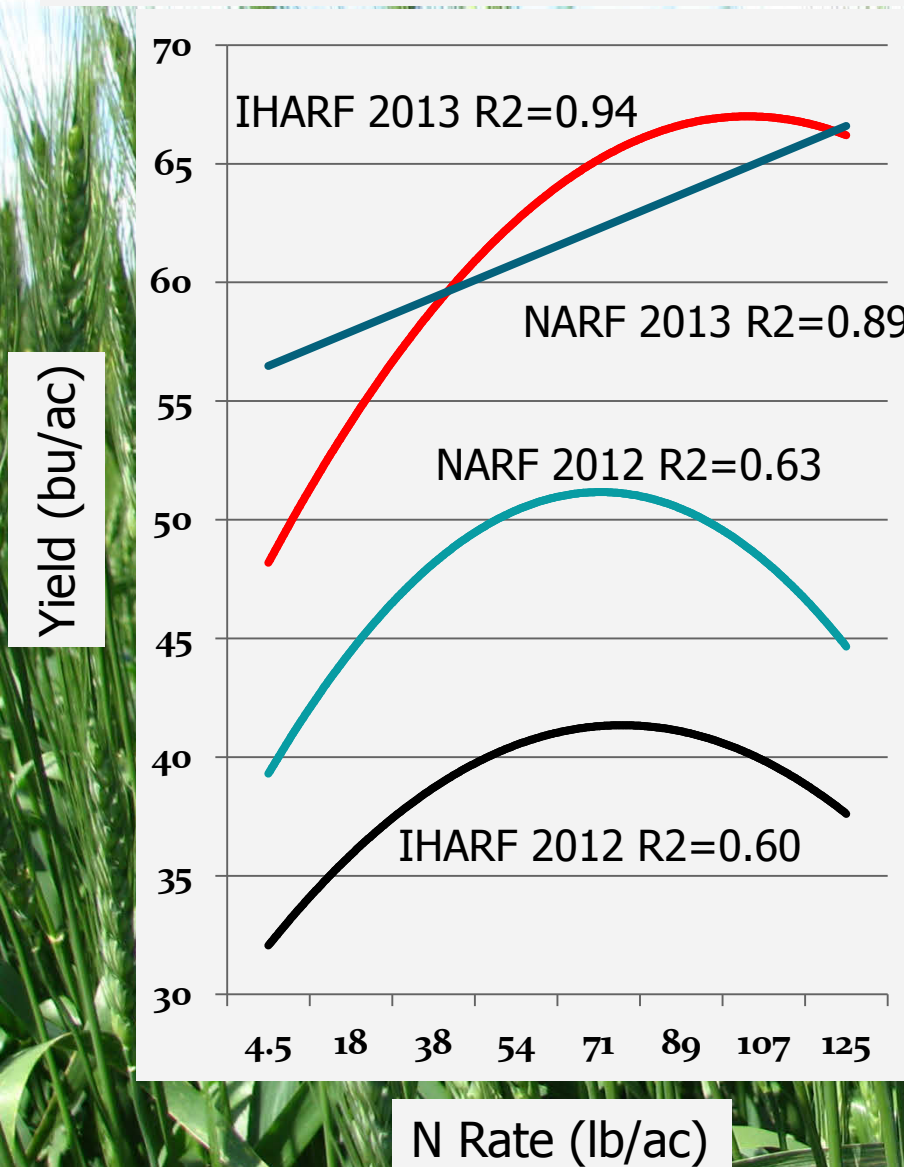
Oat Summary

- When yields are less than what we target with N
 - 60 lb/ac of N should be enough
 - Use oat to glean N after more intensively managed canola or wheat
- When yield is at or above target yields
 - Require higher N rates (80-100 lb/ac) to optimize yield.

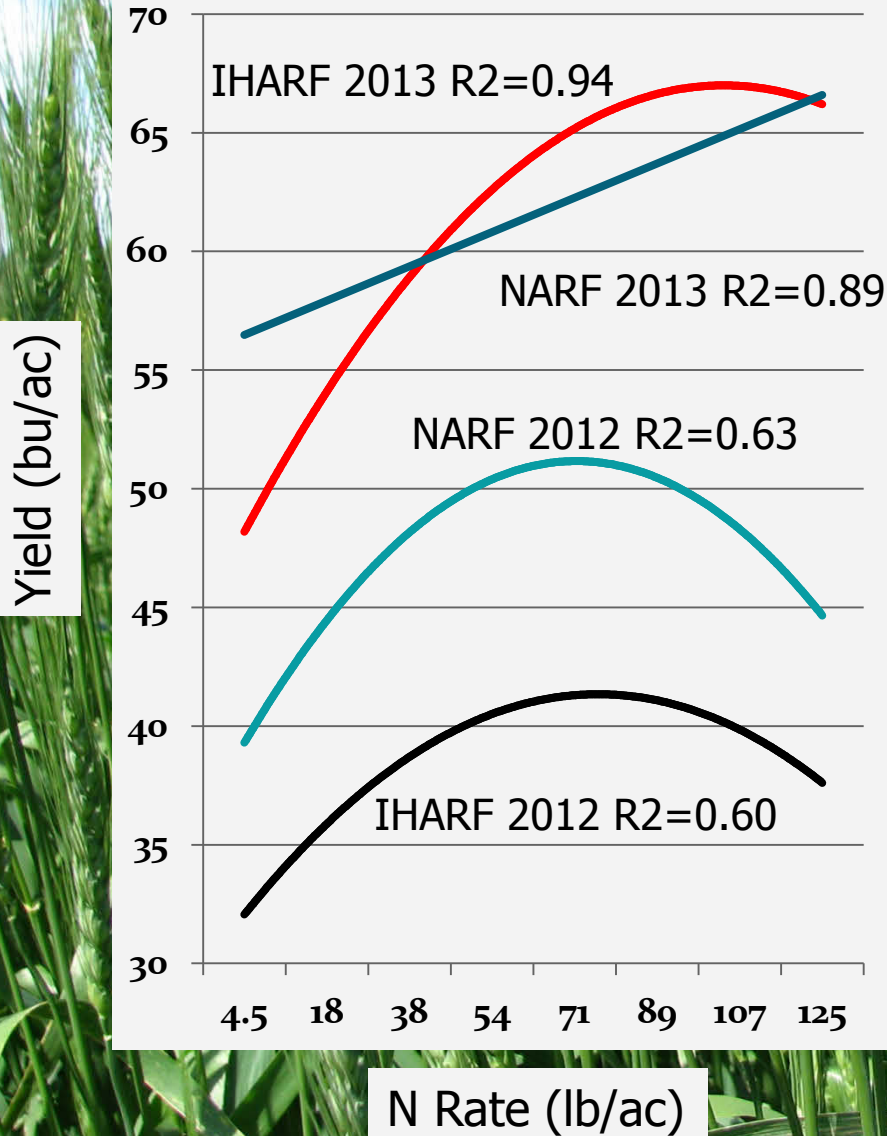
Oat Summary

- On poorly managed or low organic matter fields
 - Require higher N rates
 - May need to rebuild soil nutrient supplies
- For 2014 consider higher N rates,
 - but be aware that excess N can reduce test weight, and crop may not meet milling quality

Wheat Response to N at IHARF and NARF 2012 & 2013



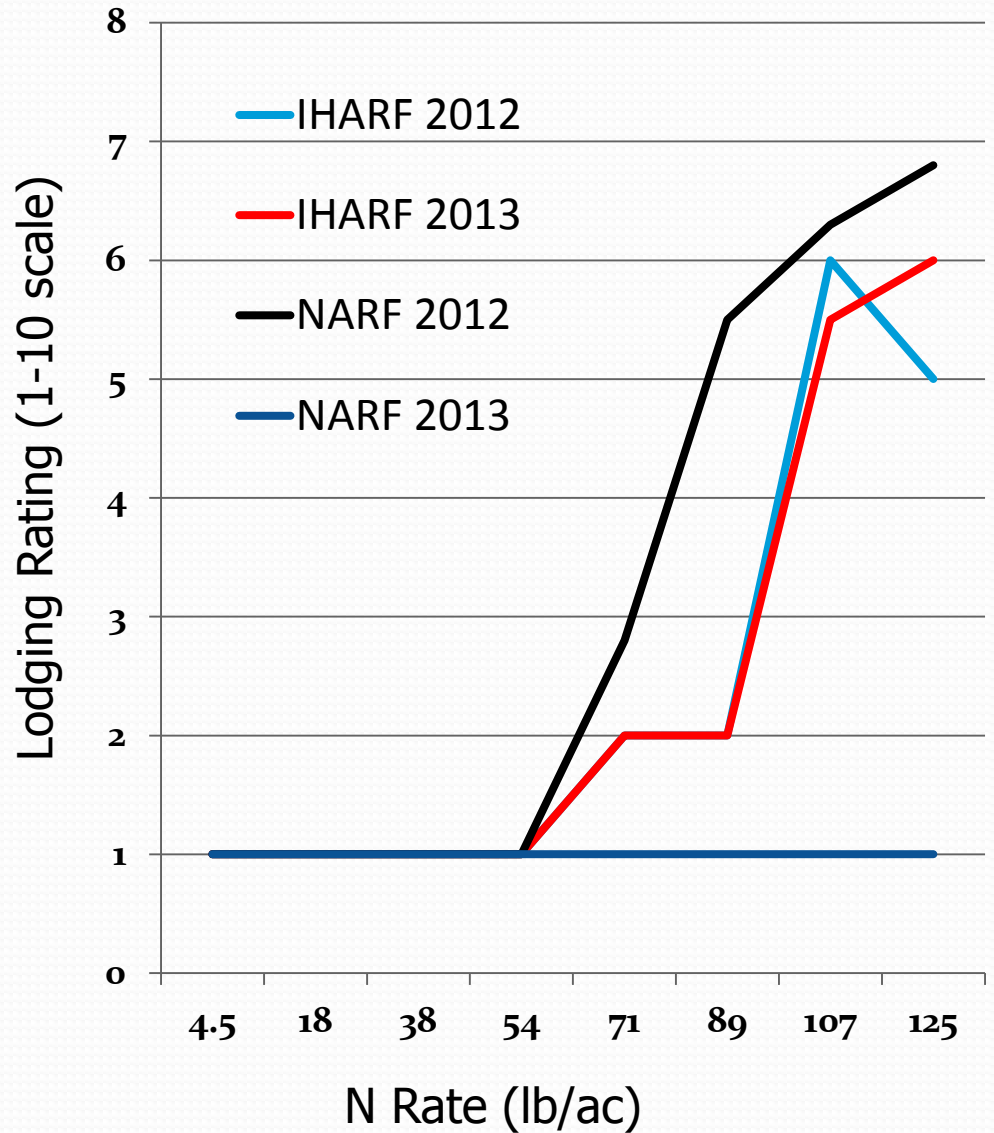
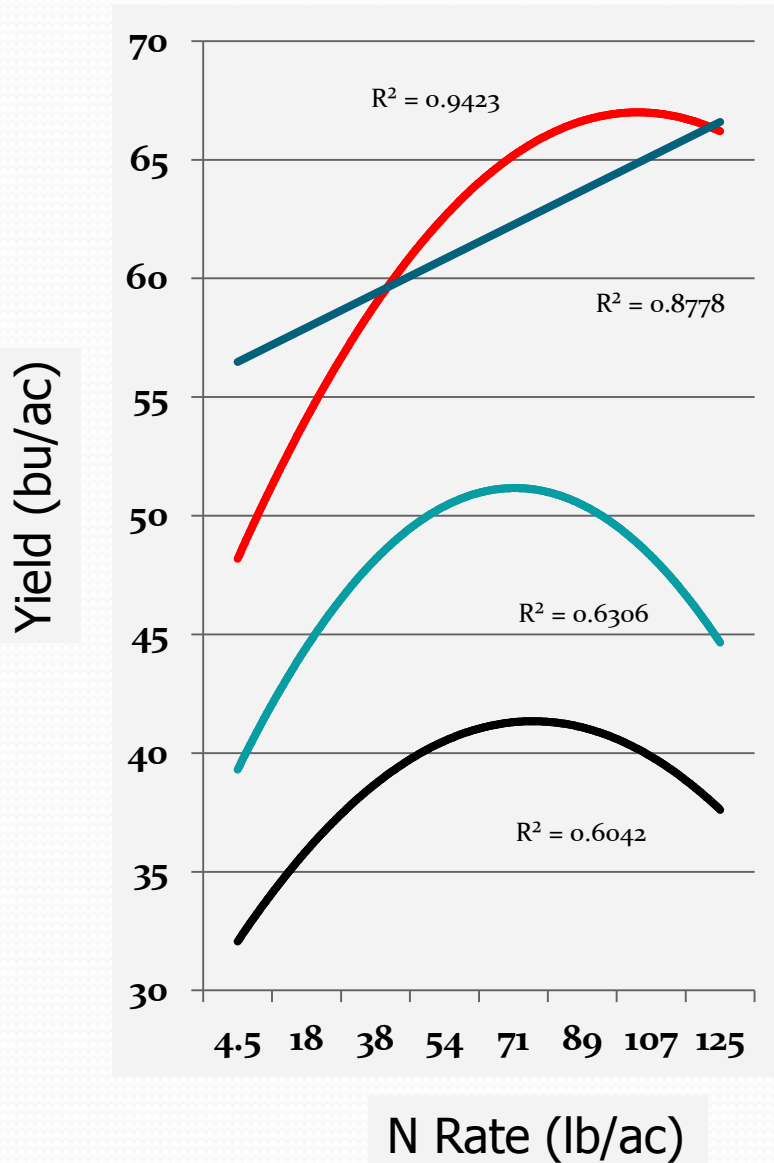
Wheat Response to N at IHARF and NARF 2012 & 2013



Optimum was about 60 lb/ac N in 2012, and 80 Lb/ac at IHARF in 2013 but not NARF 2013.
Why?

Wheat Yield and Lodging Response to N

IHARF and NARF 2012 & 2013



Lodging Likely Limits Yield Responses to Fertilizer More Than Anything Else!



Strategies to Overcome Lodging

- Lodging resistant varieties
- Restrict N Rates
- Growth Regulators
 - 2012 Results look promising
 - Expand research in 2013



Growth Regulators

- Cycocel
 - Restricts cell elongation to reduce crop height (no root shortening)
 - New formulations are more reliable
 - Most effective at 3 leaf stage
- 2013 trials
 - Melfort and Indian Head
 - Zadoks 2.1; or 3.1; split applications
 - 100%, 125% and 150% fertility levels

Growth Regulator (Manipulator) Effect on Wheat Height (inches), IHARF 2013

	100 Fert	125 Fert	150 Fert	Mean
Check	39.5	39.1	38.8	39.1
Zadoks 2.1	36.5	36.7	35.7	36.3
Zadoks 3.1	32.7	32.6	32.7	32.7
Zadoks 2.1 & 3.1	33.5	33.6	33.3	33.5
Mean	35.6	35.5	35.1	

100 Fert = 90-28-14-14 N-P-K-S

Growth Regulator (Manipulator) Effect on Wheat Height (inches), NARF 2013

	100 Fert	125 Fert	150 Fert	Mean
Check	34.5	35.9	36.8	35.4
Zadoks 2.1	34.3	35.3	35.5	35.0
Zadoks 3.1	30.5	30.3	31.1	30.6
Zadoks 2.1 & 3.1	30.8	32.7	34.3	32.6
Mean	32.5	33.5	34.4	

100 Fert = 90-28-14-14 N-P-K-S

Growth Regulator (Manipulator) Effect on Wheat Yield (bu/ac), IHARF 2013

	100 Fert	125 Fert	150 Fert	Mean
Check	70.0	72.1	75.4	72.5
Zadoks 2.1	76.8	77.5	84.1	79.5
Zadoks 3.1	81.3	84.9	89.1	85.1
Zadoks 2.1 & 3.1	80.8	80.8	88.6	80.0
Mean	77.2	78.8	84.1	

100 Fert = 90-28-14-14 N-P-K-S

Growth Regulator (Manipulator) Effect on Wheat Yield (bu/ac), NARF 2013

	100 Fert	125 Fert	150 Fert	Mean
Check	46.1	49.2	54.9	50.1
Zadoks 2.1	48.1	48.7	53.6	50.1
Zadoks 3.1	45.8	52.1	51.9	49.9
Zadoks 2.1 & 3.1	40.4	49.6	56.6	48.2
Mean	45.2	49.9	54.2	

100 Fert = 90-28-14-14 N-P-K-S

Plant Growth Regulator Summary

- Much higher yields are possible with PGR AND higher fertilizer rates.
- How reliable are responses to PGR?
- Are additional yield increases possible by combining PGR, Fert and higher plant densities, precision management)?
- Will other factors become limiting (micros, water)?
- What about PGR on other crops?



Some Take Home Messages

- Fertilizer Rates need to Increase in High Yield Cycles
- Consider Oat to 'Glean' excess N from previous years
- May need lodging resistant wheat to optimize N
- Growth Regulators may work better than lodging resistance
- Use resistant cultivars to avoid fungicides
- Know what diseases to target with fungicides
 - Resistant cultivars for wheat leaf diseases, fungicides for fusarium

Achnowledgements



**Saskatchewan
Ministry of
Agriculture**

Engage Agro



NARF and AAFC Field Day July 23, 2014



Etheryl on Barley



Rooting of Wheat

