

# Small Grain Diseases in ND 2005 Management for 2006



Marcia McMullen/Kent McKay

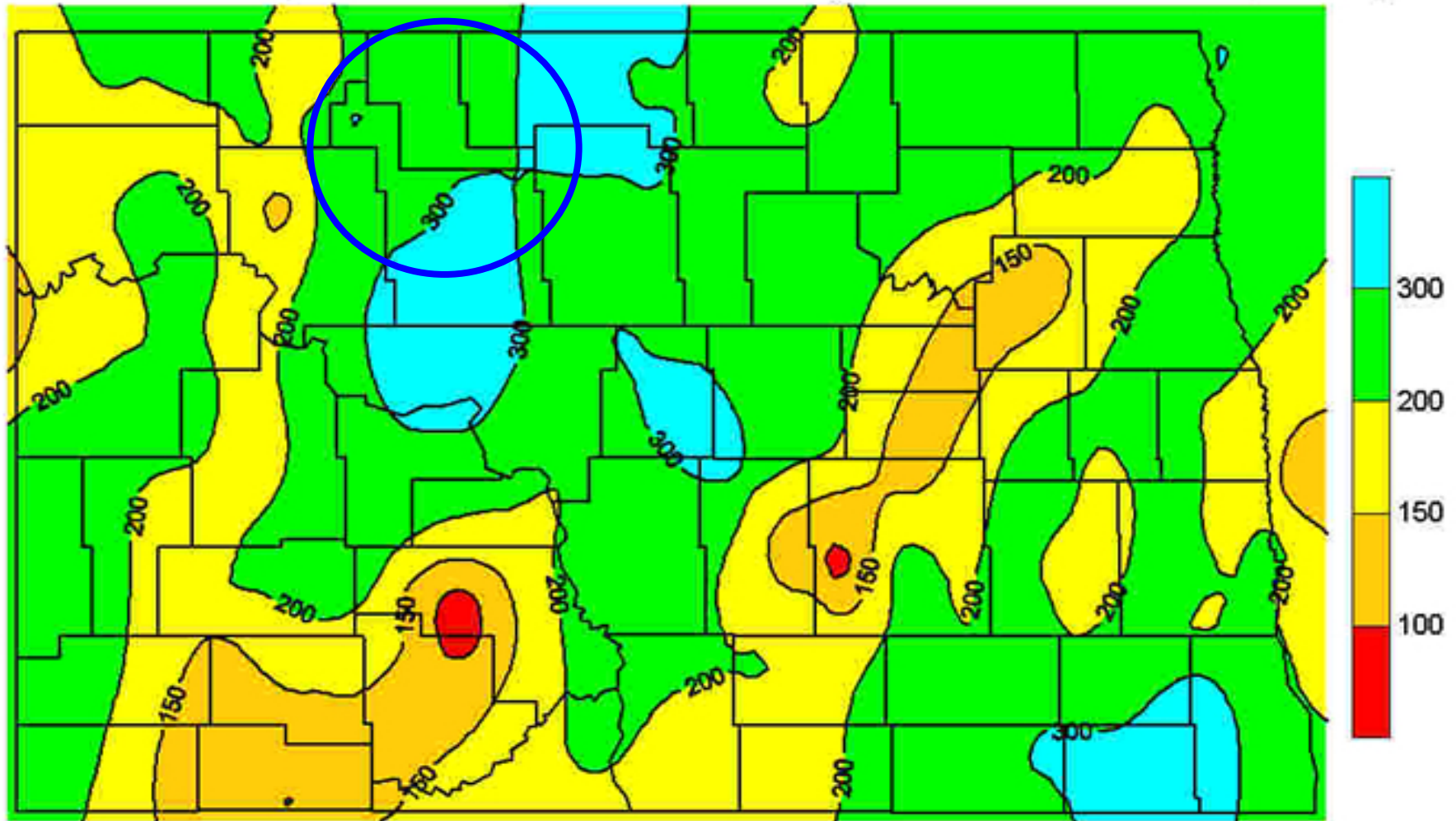
# 2005 Small Grain Disease Review

- Record precipitation in June
- Early planted (April) wheat had highest level of disease
  - Late June heading date



# North Dakota June 2005 Precipitation Percent of Normal

(Data from NWS Cooperative Network and North Dakota Agricultural Weather Network (NDAWN))



ND State Climate Office

# 2005 Small Grain disease Review

- **Record precipitation in June**
  - Heavy leaf disease (rust, tan spot) and scab in early seeded wheat, winter wheat
- **July: dry, below normal precipitation**
  - May 10 planting or later had minimal impact from scab



**Can't control weather, so....**

# Disease management directed at crop and pathogen

## – **Improve Crop:**

- Disease Resistance

## – **Reduce Pathogen:**

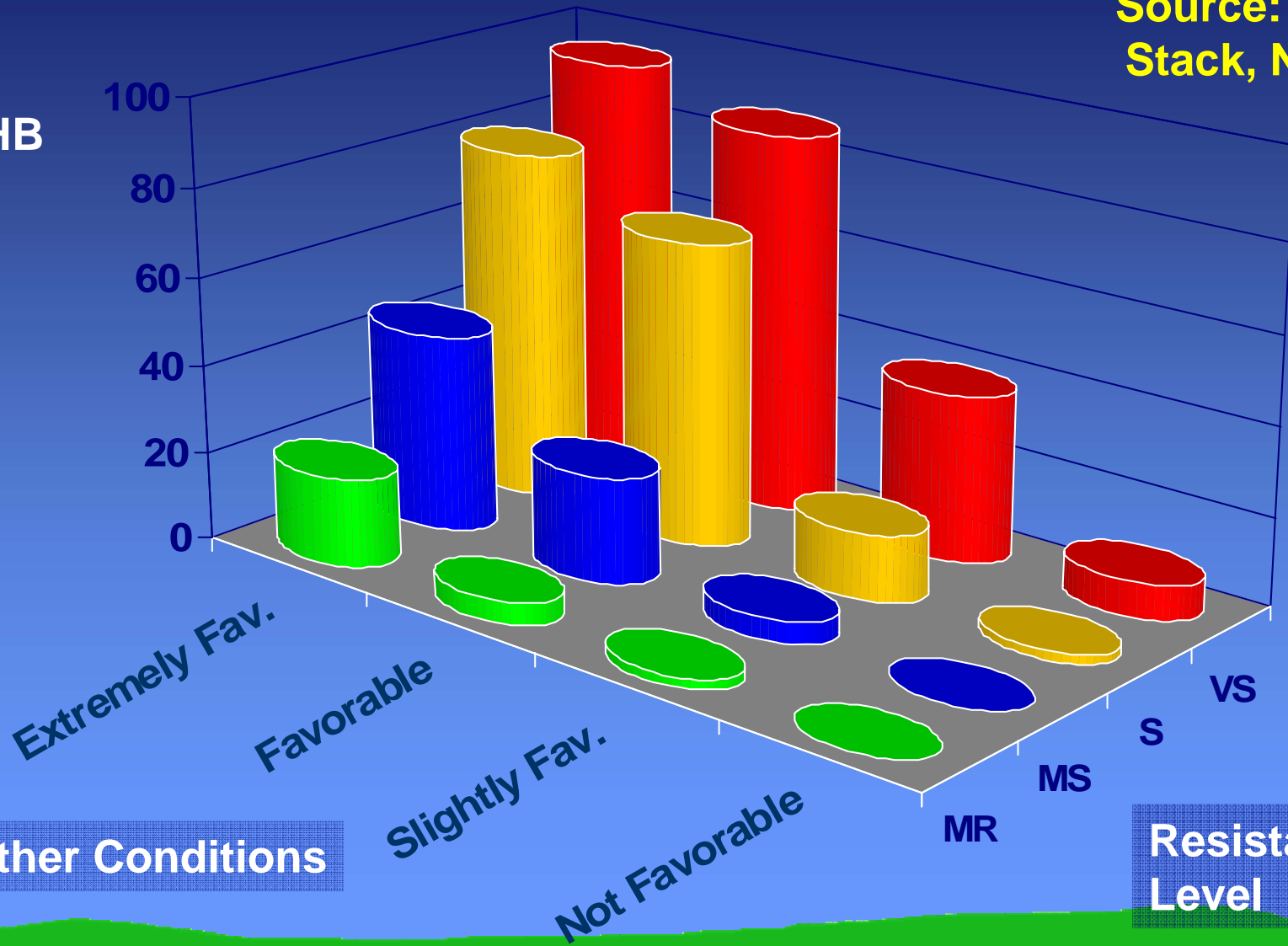
- Reduce infected stubble
- Rotations with non-hosts
- Fungicides



# Interaction of Weather and Cultivar Resistance Level in Affecting FHB (scab) Severity

Source: R.W. Stack, NDSU

% FHB



Weather Conditions

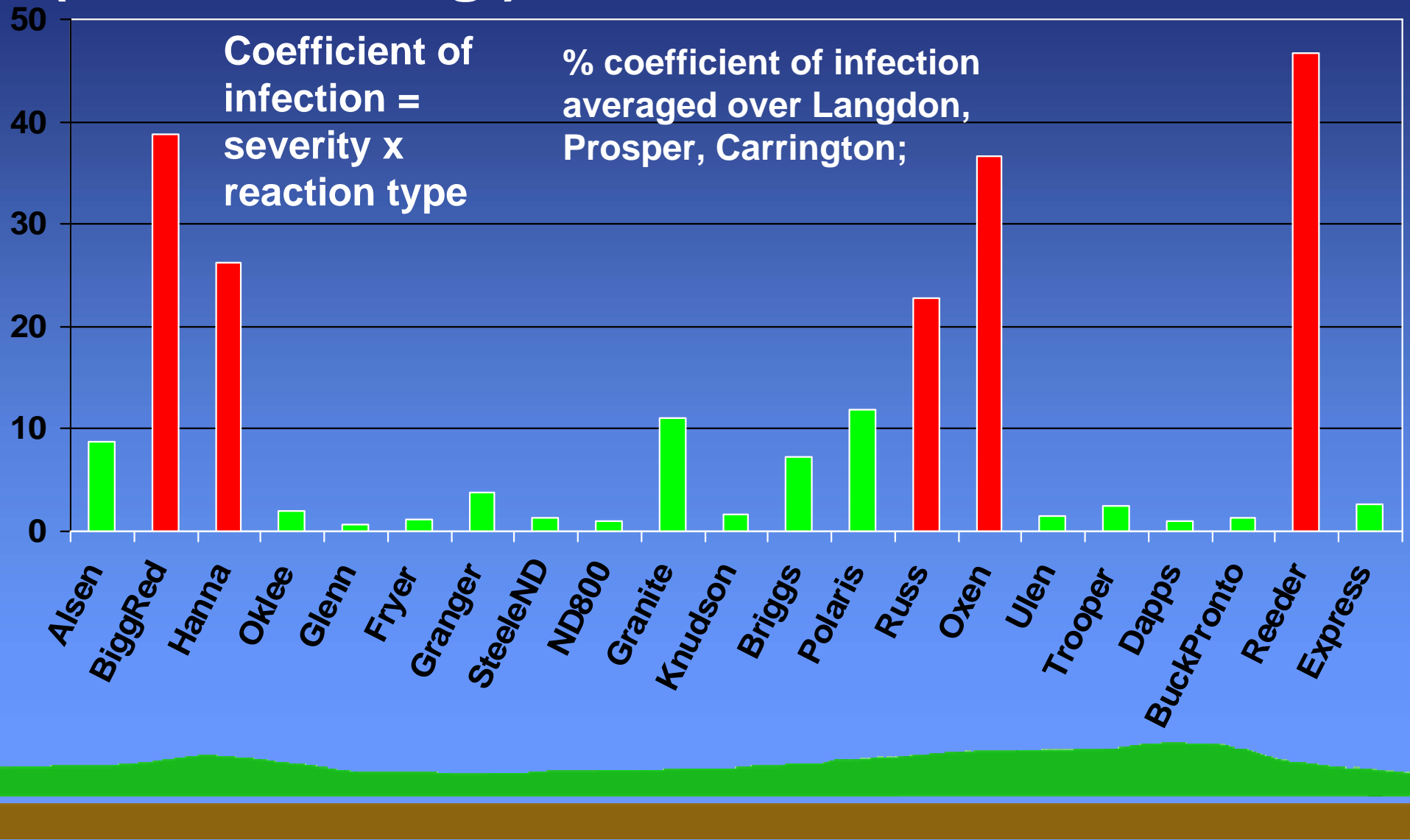
Resistance Level

# Spring Wheat Varieties FHB and Leaf Rust Ratings

Variety	Scab Rating	Leaf Rust Rating
Alsen	MR	MR
Briggs	S	R
Dapps	MS	R
Freyr	MR	MR
Granite	MS	MR
Knudson	M	MR
Parshall	M	MS
Reeder	S	S
Steele ND	MR/MS	R
Glenn	MR	R

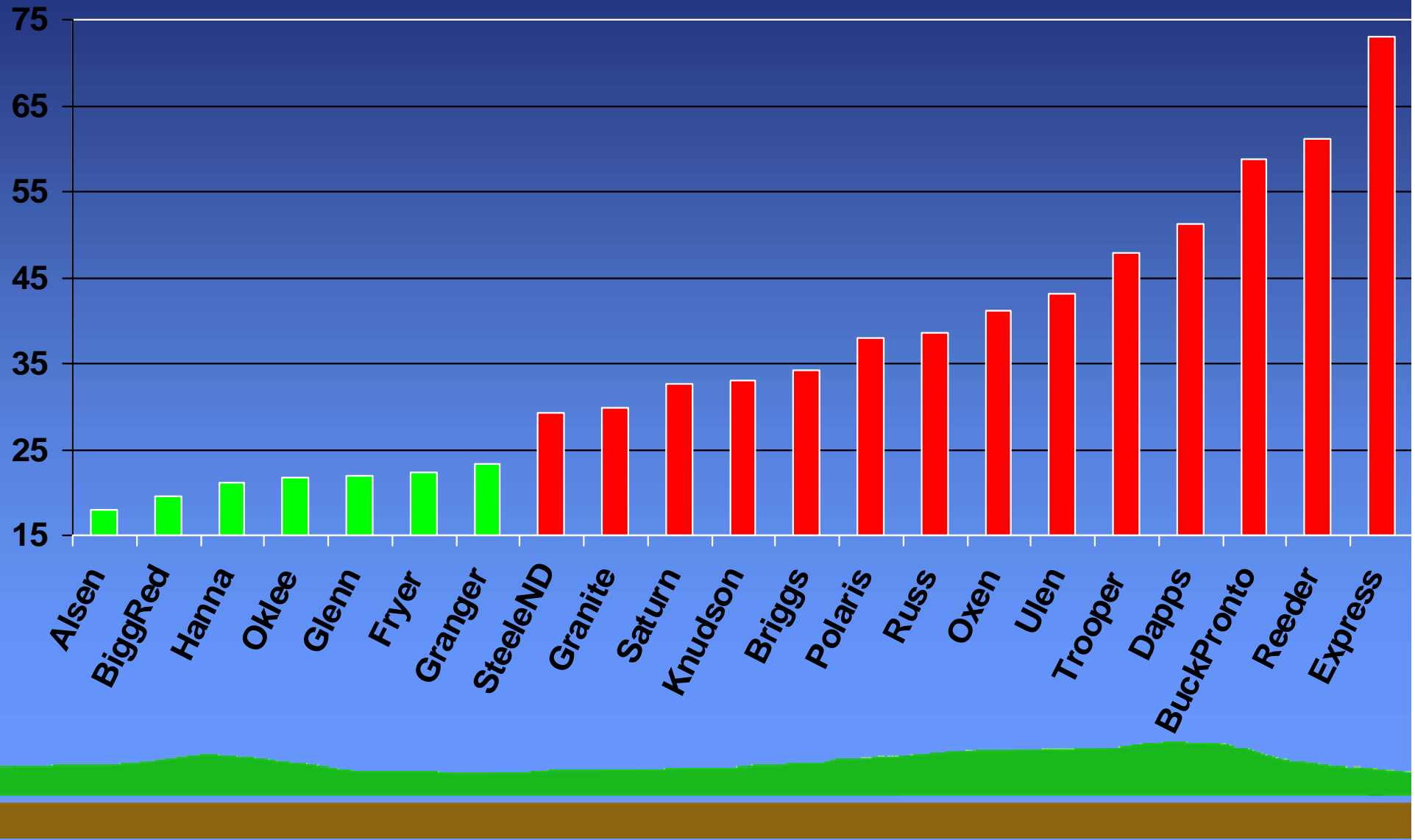
# Leaf Rust – HRSW Rxs 2005

(3 location avg.) Dr. Jack Rasmussen, NDSU Plant Path Dept.



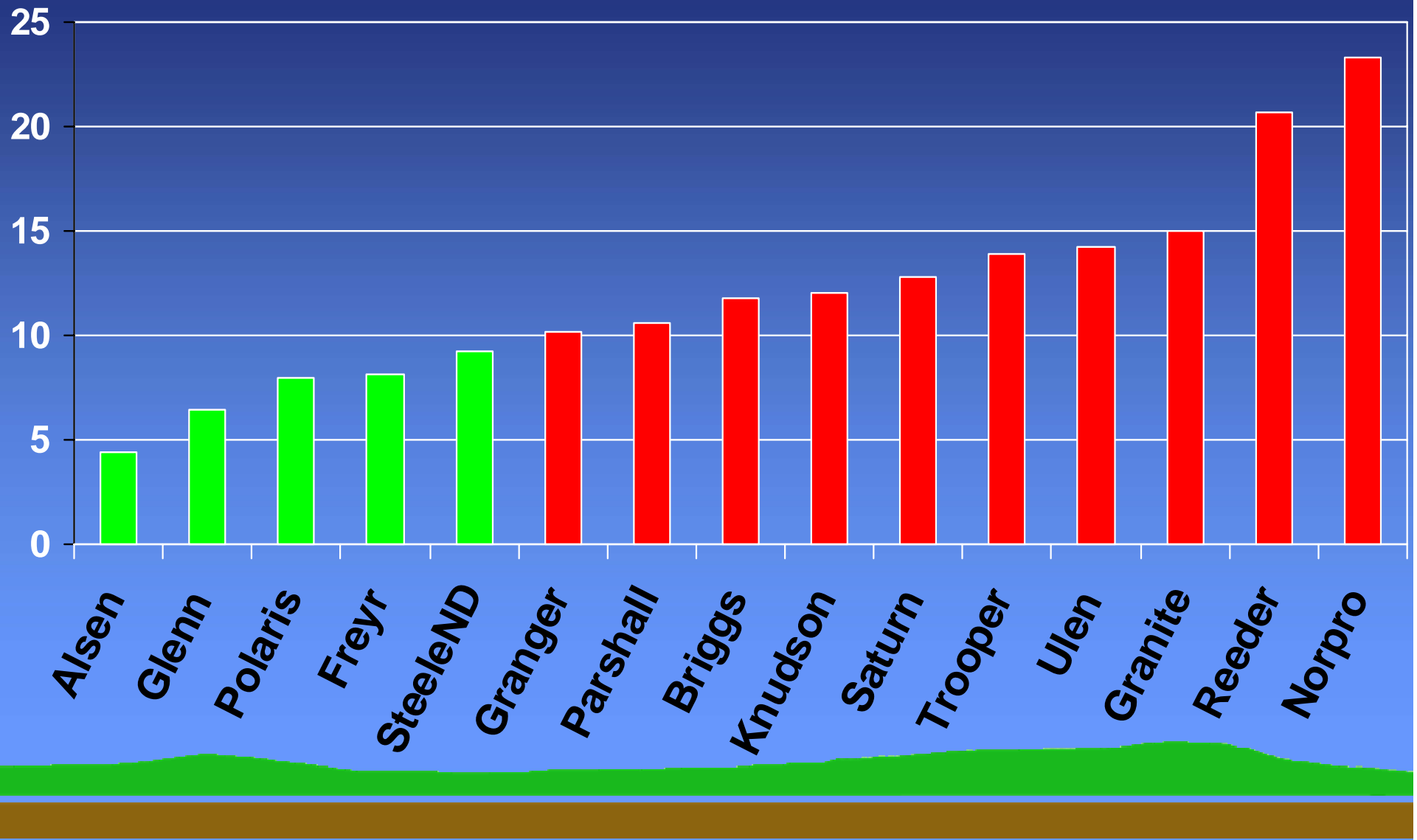
# FHB (scab) and HRSW Cvs Reaction 2005

Prosper, ND 2005 R.W.Stack, NDSU Plant Pathology Dept.



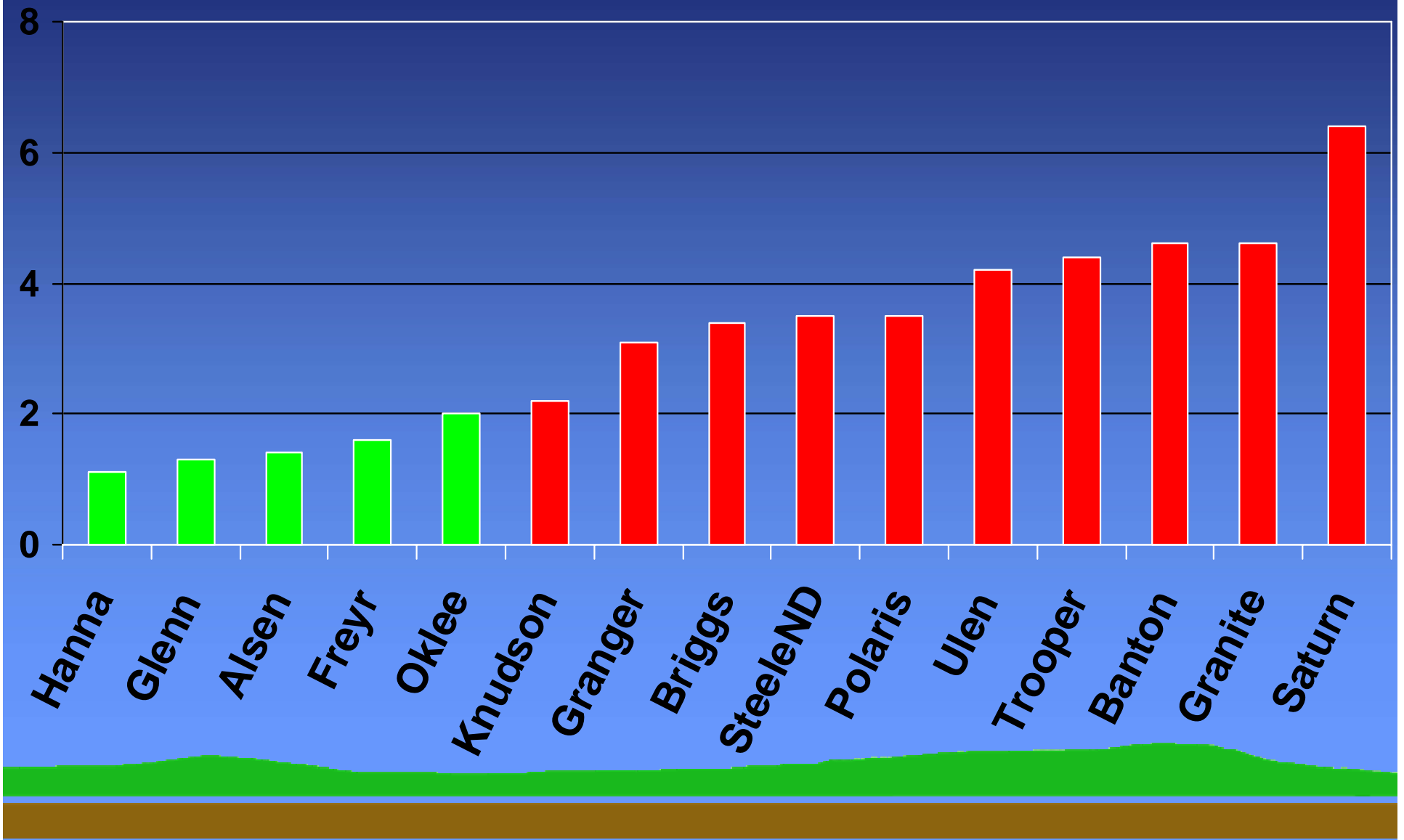
# % Tombstones (Visually Scabby Kernels)

Carrington + Off-station Sites, 2005 (B. Schatz summary)



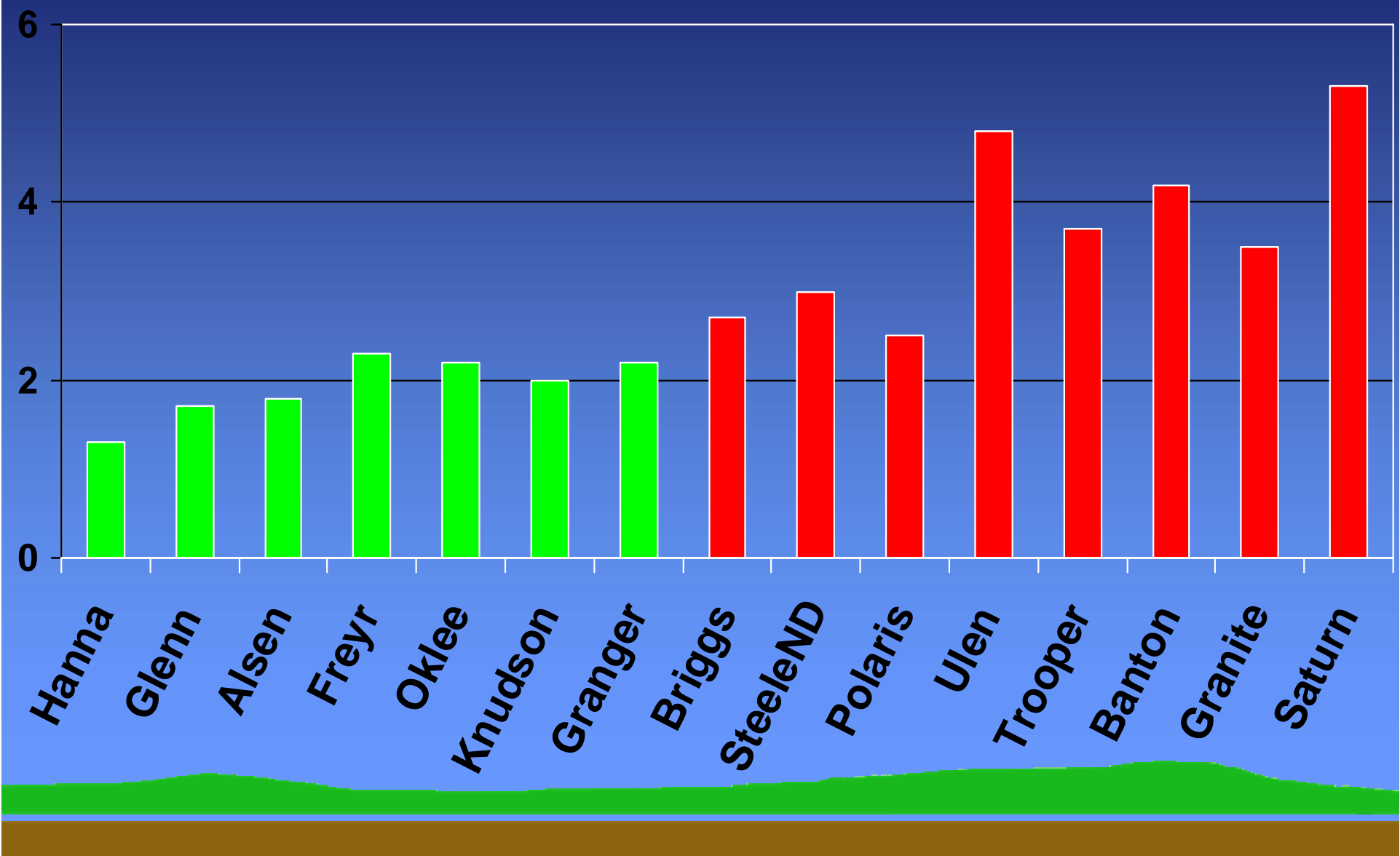
# % Tombstones NE ND 2005

(T. Gregoire summary: Langdon + off-station sites)



# DON Content (ppm) NE ND 2005

(T. Gregoire summary: Langdon + off-station sites)



# Disease Impact on Discounts

Discount Schedule on Spring Wheat, at Elevator,  
Devils Lake, ND Oct. 2, 2005

Tombstone Damage <sup>c</sup>	Discount	DON	Discount	Test Wt.	Discount
0	0	0	0	53.99	0.32
0.9	0	2	0.05	54.99	0.24
1	0.02	2.5	0.1	55.99	0.16
1.1	0.06	3	0.2	56.99	0.08
2	0.1	3.5	0.3	57.99	0.04
3	0.13	4	0.4	58	0
4	0.16	4.5	0.5		
5	0.21	5	0.6		
6	0.26	5.5	0.7		
7	0.31	6	0.8		
8	0.36				
9	0.41				
10	0.46				

Data supplied by T. Gregoire

# Discounts Due to Damage and DON

## North East ND 2005 (source: T. Gregoire)

Variety	Damage	DON	Total
Saturn	-0.26	-0.60	-0.86
Ulen	-0.16	-0.50	-0.66
Banton	-0.16	-0.40	-0.56
Granite	-0.16	-0.30	-0.46
Trooper	-0.16	-0.30	-0.46
Steele-ND	-0.13	-0.20	-0.33
Briggs	-0.13	-0.10	-0.23
Polaris	-0.13	-0.10	-0.23
Granger	-0.13	-0.05	-0.18
Knudson	-0.1	-0.05	-0.15
Freyr	-0.06	-0.05	-0.11
Oklee	-0.06	-0.05	-0.11
Alsen	-0.06	0.00	-0.06
Glenn	-0.06	0.00	-0.06
Hanna	-0.02	0.00	-0.02

# Disease management directed at host and pathogen

## – Host:

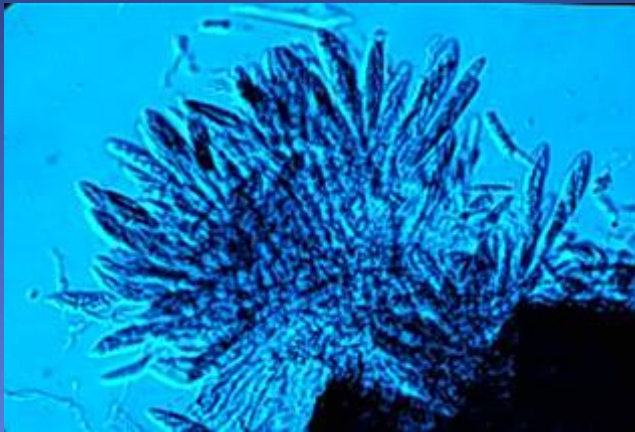
- Resistance

## – Reduce Pathogen:

- Reduce infected stubble
- Rotations with non-hosts
- Fungicides



**Pathogen:** Spores of Scab fungus and tan spot and Septoria fungi develop in residue of a number of grass crops.



**Ascospores of scab fungus**

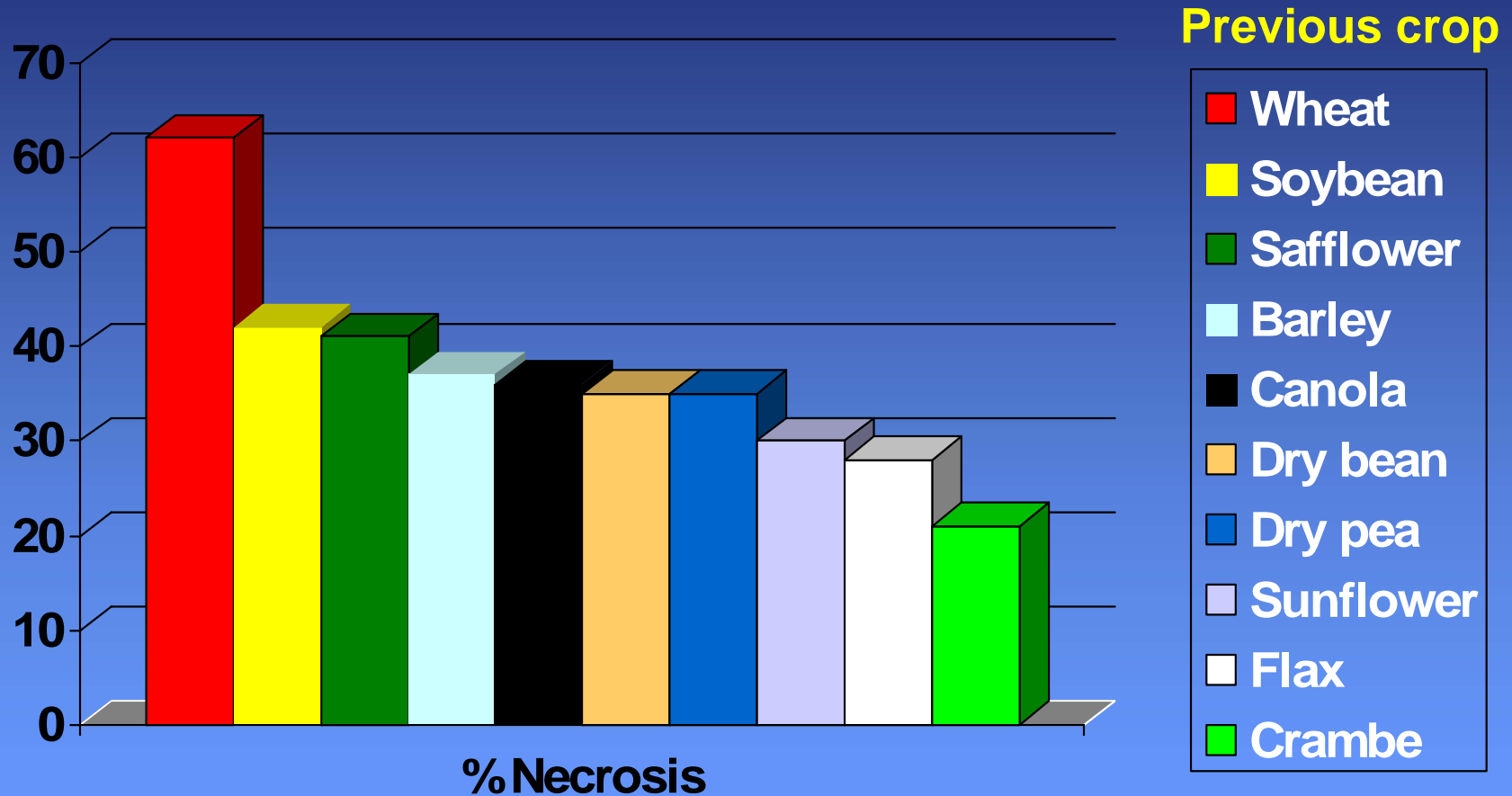


**Overwintering sites of fungi that cause tan spot and Septoria**

Of major fungal pathogens, only Leaf rust fungus does NOT overwinter in ND



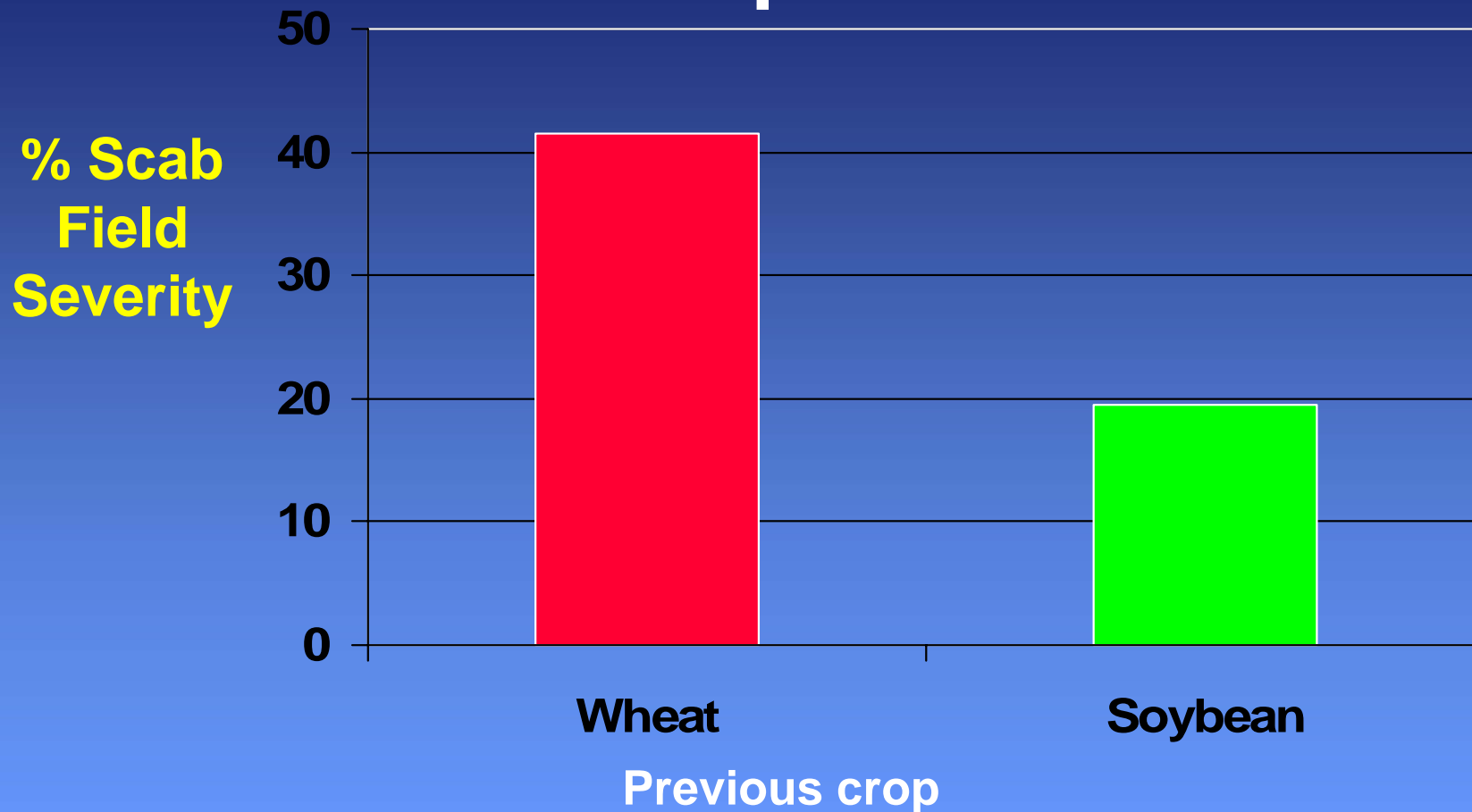
# Rotations and Wheat Leaf Spots



J. Krupinsky et al. 2002



# Large Scale Field Results: Rotation Impact on FHB - 2005 ND



Two adjacent fields of 'Reeder' spring wheat, Fargo. Each minimum-tilled with abundant previous crop residue.

# Disease management directed at host and pathogen

## – Host:

- Resistance

## – Reduce Pathogen:

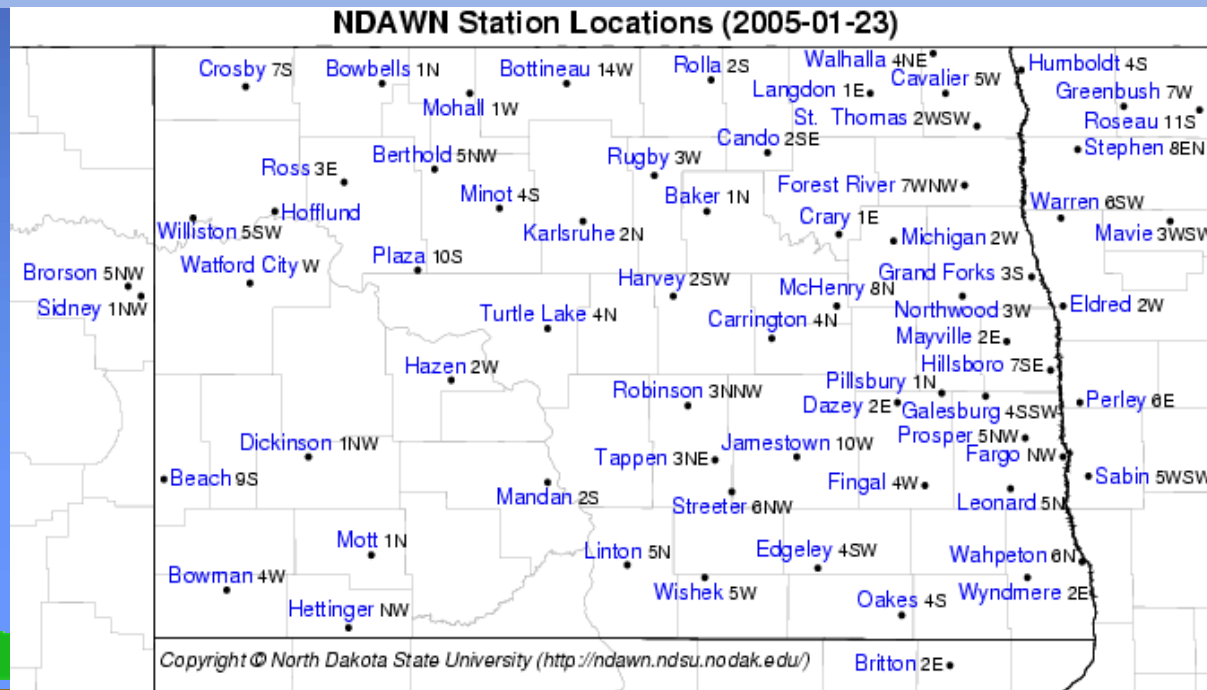
- Reduce infected stubble
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# Fungicides for Control of Leaf Diseases and FHB

**NDSU Disease Forecasting System  
Helps Predict Necessity of Fungicides**

**NDSU Forecasting System Based on  
Weather Data from NDAWN sites**



# Example: Mohall, June 15, 2005 Disease

## Forecasting sites indicated high risk of leaf spots in mid-June

Interpretation: Yes = infection likely, No = infection unlikely.

Disease risk at Mohall	6/14	6/13	6/12	6/11	6/10	6/9	6/8	6/7	6/6	6/5
Tan spot	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
S. Blotch	Yes	No	No	No	No	Yes	Yes	Yes	No	No
Leaf rust	Yes	No	No	No	NO	No	No	No	No	No



Tan spot



Septoria blotch



Leaf rust

# Tan spot

- Establishes early in the growing season
- **Epidemics can occur rapidly if environmental conditions are optimum for disease development**
- If not controlled, the disease can work it's way up the plant canopy



# Early tan spot infection of wheat and Early Season Fungicide Control

**Tilt**  
**Bumper**  
**Propimax**  
**Stratego**  
**Quadris**  
**Headline**  
**Quilt**  
**Mancozebs**

- ALL very good on leaf spot diseases at tillering (4 to 5) leaf stage;
- Generally applied at 1/2 full label
- Best response when wheat planted into previous wheat field

# Early application:

Averaged across Carrington & Fargo, ND, 2005 (Reeder HRSW)  
Cooperative trial with Bayer CropScience

Treatment and rate/acre	Growth stage	Yield* bu/a (+ bu)	% Yield incr.	Lb Twt incr.
<b>Untreated</b>		32.6		
<b>Stratego 4 fl oz</b>	<b>Fks 2</b>	<b>36.1 (3.5)</b>	<b>10.6</b>	<b>0.2</b>
<b>Stratego 5 fl oz</b>	<b>Fks 2</b>	<b>35.8 (3.2)</b>	<b>9.6</b>	<b>0.4</b>
<b>Absolute 2 fl oz</b>	<b>Fks 2</b>	<b>36.3 (3.7)</b>	<b>11.2</b>	<b>0.3</b>
<b>Headline 3 fl oz</b>	<b>Fks 2</b>	<b>37.4 (4.5)</b>	<b>14.7</b>	<b>1.1</b>

Absolute = trifloxystrobin + tebuconazole; Stratego = trifloxystrobin + propiconazole;

\*Yield increases alone resulted in about **2x** return on fungicide investment

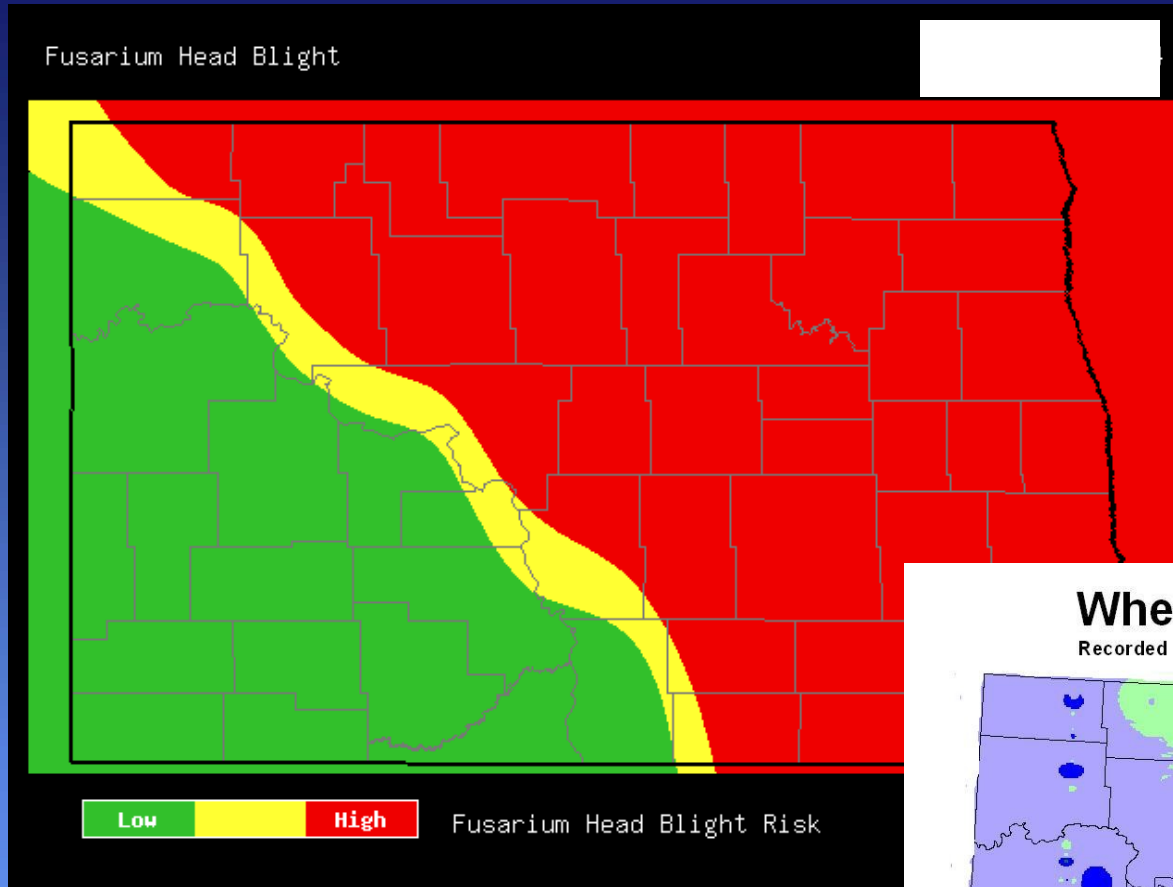
# Disease Forecasting Site Also Predicts Risk of Fusarium Head Blight (Scab) at Flowering

**Fusarium Head blight (scab)**

July 14, 2003



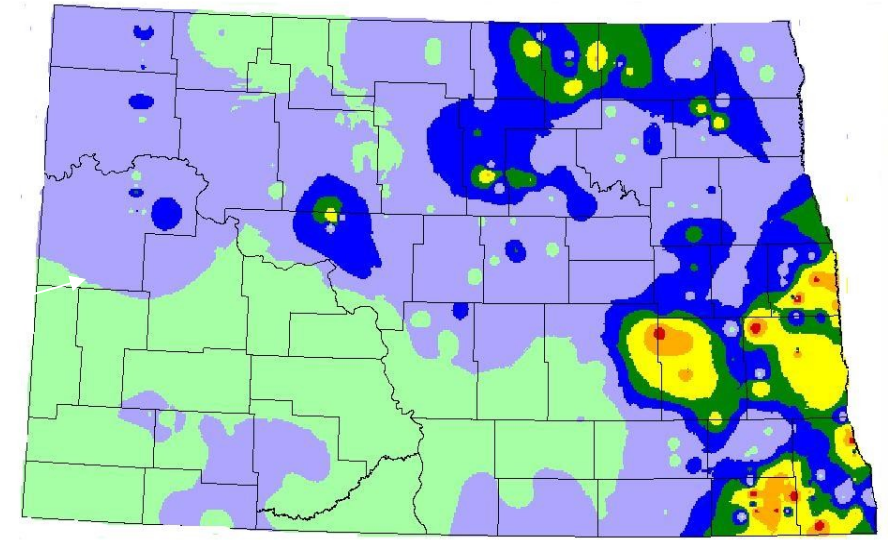
# Risk Map For Fusarium Head Blight Also Available at Site



Actual Fusarium (scab) severity in 2005  
As determined in NDSU Wheat Survey

## Wheat Scab Index - 2005

Recorded by Field Scouts of the 2005 NDSU IPM Survey



0 - 1 1 - 5 5 - 10 10 - 15 15 - 25 25 - 35 35 - 55

# Spraying for Scab:

- Summary on Folicur: what to expect?
  - 15 to 20% yield response common
  - Reduction of scab by 50 to 80%
  - Reduces DON by 33 to 50%
  - 1 ½ to 2 lb increase in test weight
- New fungicides
  - Bayer, Dupont reducing DON 50 to 75%

# Fungicide results: 2005 Uniform HRSW

## Fungicide Trial

Average of Carrington, Langdon & Fargo

Treatment* and rate/acre	FHB FS %	DON** ppm	FDK %	Yield Bu/A	% Yield Incr.	Twt Lbs/Bu
Untreated	17.5	9.0	13.8	40.3		58.3
<b>Folicur 4 fl oz</b>	<b>9.0</b>	<b>6.1</b>	<b>7.7</b>	<b>49.7</b>	<b>23.3</b>	<b>59.1</b>
Prosaro 6.5 fl oz	7.4	4.8	5.9	53.7	33.3	59.9
BAS555 13.5 fl oz	7.8	4.7	7.0	51.4	27.5	59.5
Punch 8 fl oz	10.1	5.5	8.1	47.3	17.4	59.1
<i>LSD 0.05</i>	4.6	1.5	2.8	2.3		0.7

\*Reeder at Carrington and Fargo; Glenn and Grandin at Langdon; Fungicide applied with forward/backward nozzles, 40 psi, 20 gpa; \* All fungicides tested are triazoles; Folicur = Sec. 18 product available to growers, others are still experimentals. \*\* DON data only available from Fargo and Carrington as of Nov. 15, 2005

# Impact on Return - Using 2005

**Uniform data** (over 4 trials, some locations severe FHB)

**Estimated from Discount Schedule at Elevator on  
Spring Wheat, Kindred, ND Nov. 2, 2005**

	No Fungicide	With Fungicide	Discount
Test Wt	58.3 lb	59.1 lb	0 for 58 lb +
Damage	13.8%	7.7%	\$0.03/% over 2%
DON ppm	7.8 ppm	5.8 ppm	\$0.05/0.5 ppm > 2ppm
Price (\$/Bu)	~\$3.00	~\$3.34	Based on \$3.66/bu
Yield	40.3	49.7	
Return/A	\$120.90	\$151.50 (includes - 14.50/A for fungicd.)	<b>Net from fungicide. \$30.60/A</b>

## Fungicide impact on HRS Wheat Varieties, Mohall, 2001.

Treatment*	FHB % FS	DON ppm	Lf Dis. %	Yield bu/A	Test Wt. lb/bu
Reeder - untreated	25.9	13.0	25.7	27.0	56.8
Reeder - Folicur	8.3	8.9	5.1	37.9 (+40%)	58.3 (+1.5)
Alsen - untreated	3.7	4.8	24.1	34.9	59.3
Alsen - Folicur	1.4	3.9	5.2	39.2(+12%)	59.9(+0.6)
Parshall - untreated	10.7	10.1	25.5	31.7	58.3
Parshall - Folicur	4.7	6.3	4.9	40.8 (+29%)	59.9 (+1.6)
Russ - untreated	25.6	15.1	33.3	30.8	56.8
Russ - Folicur	5.8	8.4	6.7	41.2 (+34%)	58.7 (+1.9)
LSD P=0.05	4.9	3.6	3.0	5.7	1.1

\*Folicur at 4 fl oz/A + 0.125% Induce applied at 75% anthesis with 8002 Twinjet nozzles at 20 gpa

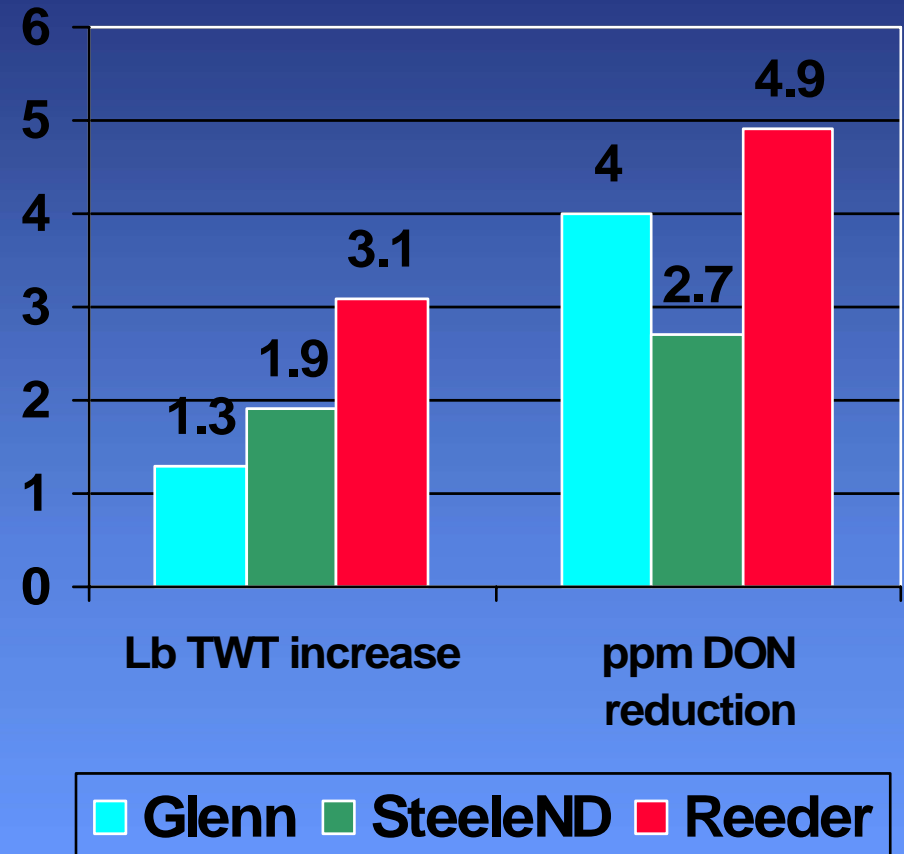
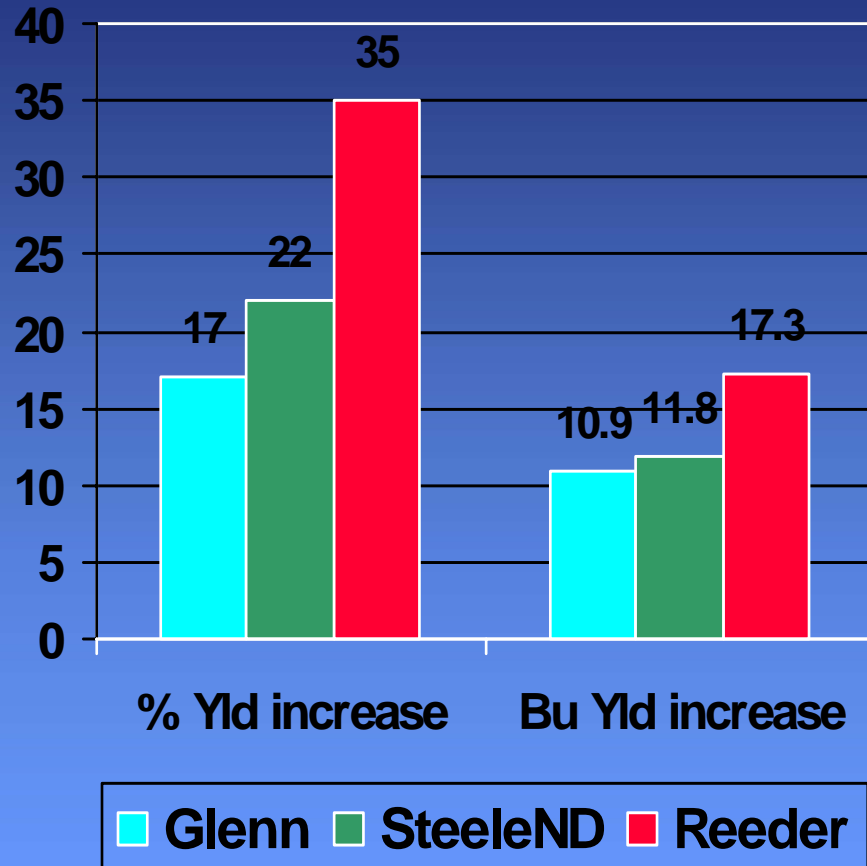
# What about HRS Variety x Fungicide Interaction? Carrington, 2004.

Source: Greg Endres and Blaine Schatz, CREC

Variety	Trt	FHB FS %	DON ppm	Leaf dis. %	Leaf rust %	Grain yield bu/A	Test wt lb/bu
Granger	Untrt	2.6	2.7	20	4	71.2	59.2
Granger	Folicur	0.5	1.2	4	0	79.2 (+8.0/10%)	59.9 (+0.7)
Reeder	Untrt	6.8	4.4	49	19	55.8	58.4
Reeder	Folicur	1.0	2.4	9	0	74.4 (+18.6/25%)	60.3 (+1.9)

# 2005: HRS Variety x Fungicide Trial, Carrington Effect of **Folicur (4 fl oz) Application** at Flowering

Source: Greg Endres, Carrington REC



# What happens if have super susceptible variety? Express vs Alsen Sabin, MN 2005

	Yield (bu/a)		DON (ppm)	
Trt	Express	Alsen	Express	Alsen
Untrt	14.5	31.1	6.7	1.7
Folicur	23.2	34.9	3.3	1
% Increase or Decrease	60	12.2	50.7	44.1

Fungicide treatment improved yield by 60% on Express wheat, but could NOT RESCUE a very FHB susceptible cultivar; **FHB very severe at this site on early planted wheat** : Data from Bayer CropScience Farm

# Aerial Application Study on HRSW Hunter and St. Thomas, ND 2005

Scott Halley, Vern Hofman, Marcia McMullen



**Application volumes (3 – 7 gpa)**

**Droplet size (fine and medium)**

**Folicur fungicide applied at early flowering;**

**Commercial fields of Briggs HRSW at  
Hunter, Reeder HRSW at St. Thomas**

**All treatments significantly improved yield**

**~ 15- 15.8% (7 bu)**

**All treatments significantly improved twt**

**~ 1.1-1.5 lb**

**All treatments significantly reduced DON**

**~ 40-50%**

# Summary: Disease Management

- **Wheat Diseases Best Controlled with Integrated Strategy**
- **Variety choice can impact response**
- **Previous crop can impact response**
- **Disease forecasting models help with fungicide decisions**
- **Fungicides can economically improve yield and quality if applied correctly and in combination with other strategies**

Questions?