Wheat Disease Update and Management

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Key Topics Covered Today

- Fungicide questions asked during 2017 growing season
- Management tools used for fungal leaf spots and stripe rust
- Fusarium head blight fungicide update

Using a Fungicide Seed Treatment

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Which has a longer residual as a seed treatment on wheat?

Fungicide

OR

Insecticide

Small Grain Fungicide Seed Treatment

*Adapted from Montana State University Small Grain Seed Treatment Guide

Active Ingredient	Fusarium Crown Rot	Common Root Rot	Pythium	Loose Smut	Common Bunt
Metalaxyl	N	N	E	N	N
Ipconazole	V	V	N	E	E
Pyraclostrobin	V	V	N	E	E
Sedaxane	E	V	N/A	E	E
Pyraclostrobin + Triticonazole + Metalaxyl	V	E	E	E	E
Tebuconazole + Metalaxyl	V	V	E	E	E
Sedxane + Difenoconazole + Mefenoxam	E	V	E	E	E

E = Effective control, V = Moderate control, N = no effect, N/A – not tested

Seed Borne Diseases

Fungicide seed treatments are very effective!

Wheat Root Rots in ND

Fusarium Crown Rot

Common Root Rot

Take-all

Pythium

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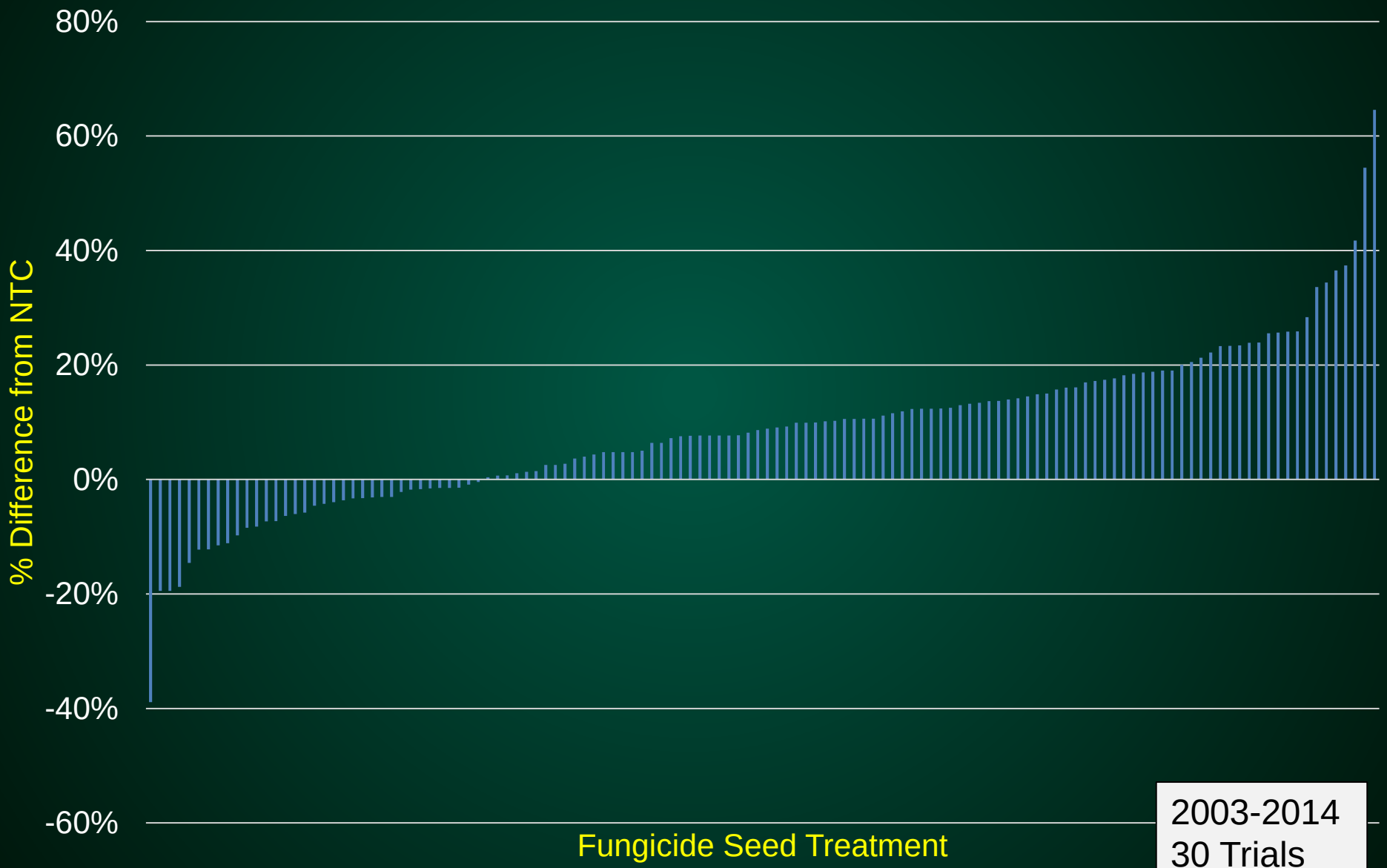
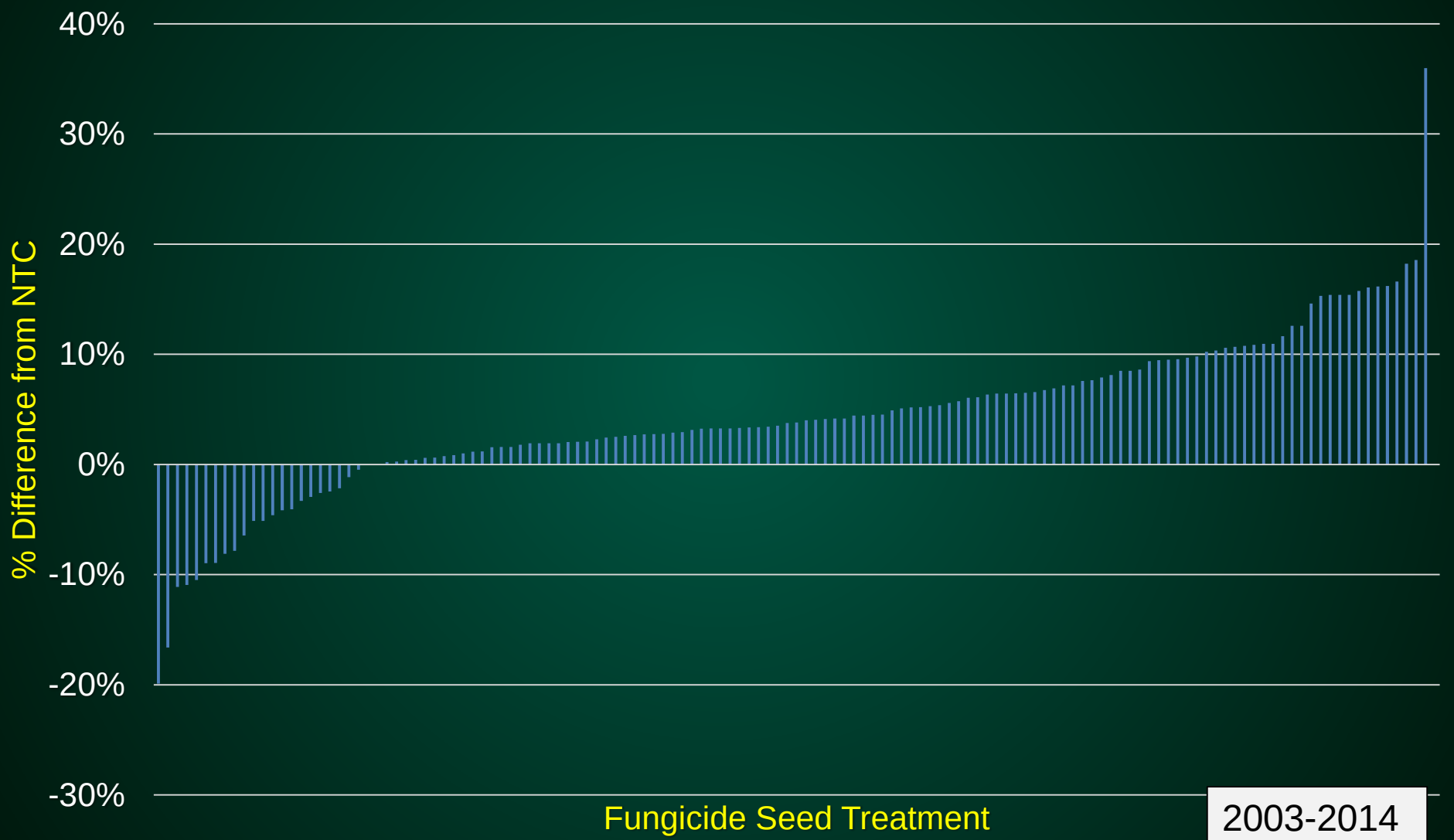
HRSW Seed Treatment Trials

- 2003-2014
- 30 Trials (inoculated or wheat-wheat)
- 6 locations (southwest, central, eastern)
- FRAC 3, 4, 7,11 and M3 (singularly and in combination)

HRSW Seed Treatment - Stand



HRSW Seed Treatment - Yield



2003-2014
30 Trials
6 locations

Why are there inconsistent stand and yield responses?

Root Rot Management

- Crop rotation – wheat on broadleaf
- Consider planting conditions
- Field history
- Fungicides work great against seed borne diseases….inconsistent response stand and yield

Foliar Diseases

Residue-borne Disease

Influence of Previous Crop, Tillage and Fungicide

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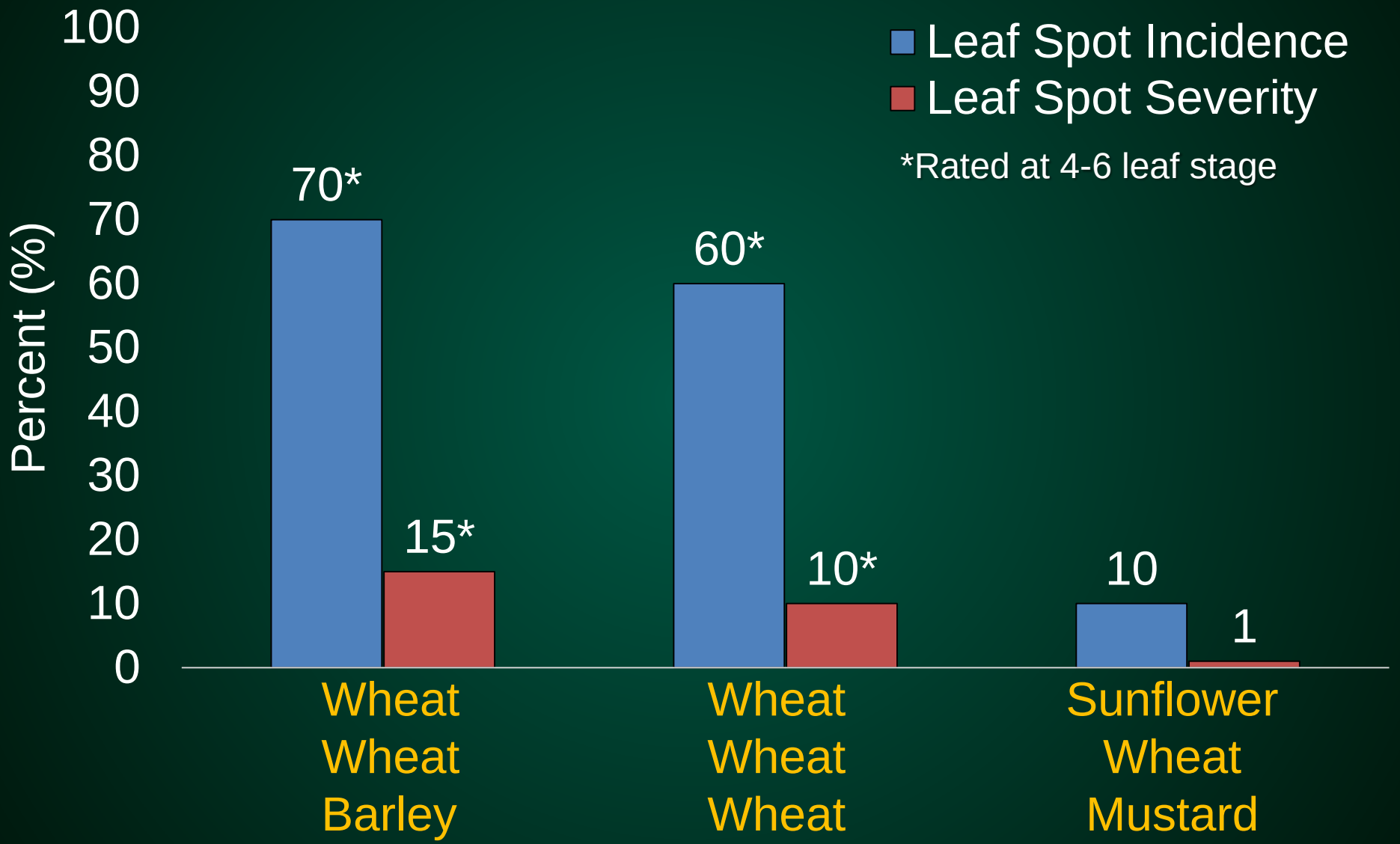
Do you always recommend a fungicide for wheat at tillering with the herbicide?

First Study – Fungal Leaf Spots

- No-till production system
- Three different crop rotations
- One fungicide (Propiconazole) applied at tillering
- Southwest North Dakota

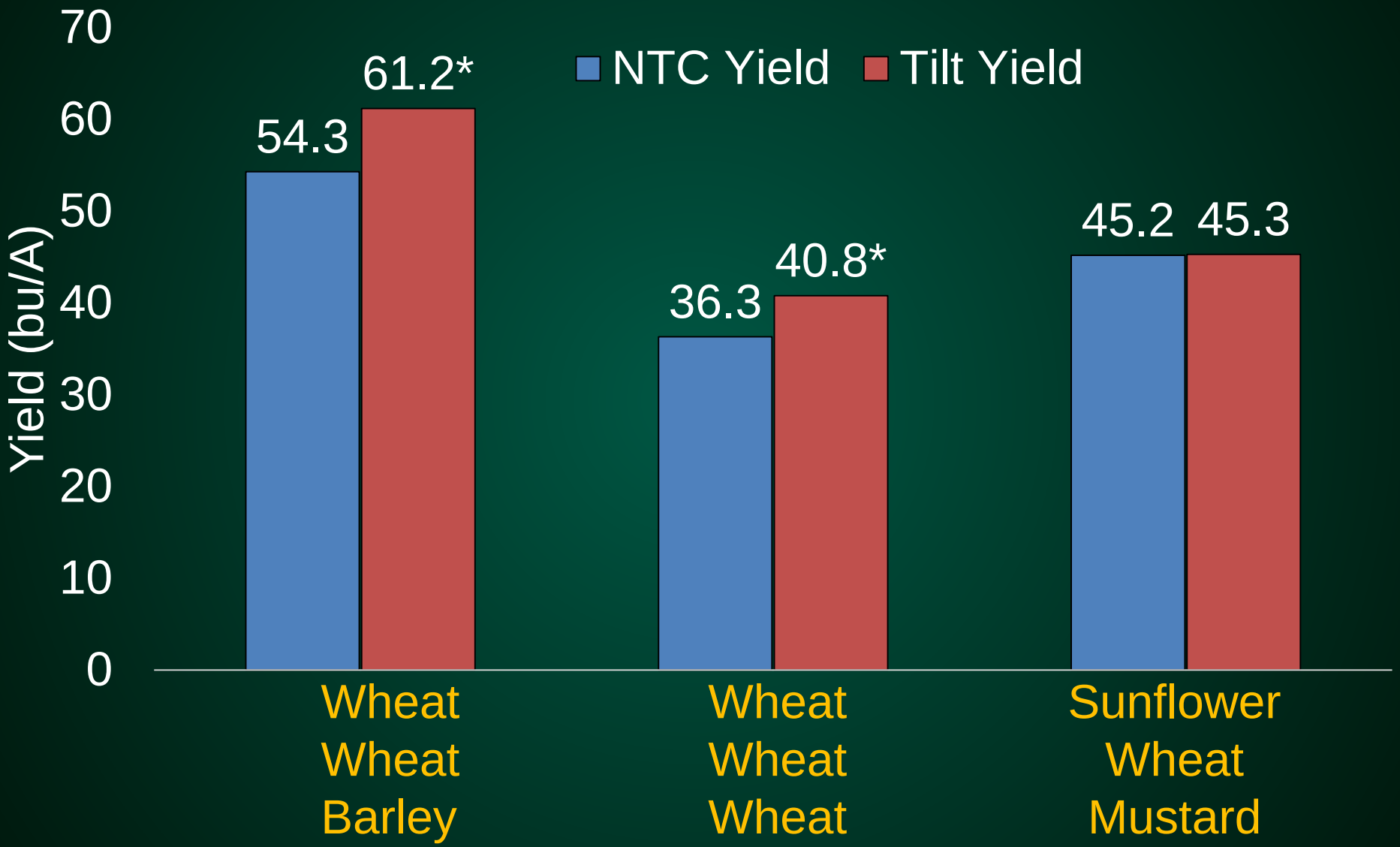
HRSW Trials conducted in 2000



Disease means statistically different

Study conducted by R. Ashley et al. 2000

HRSW Trials conducted in 2000



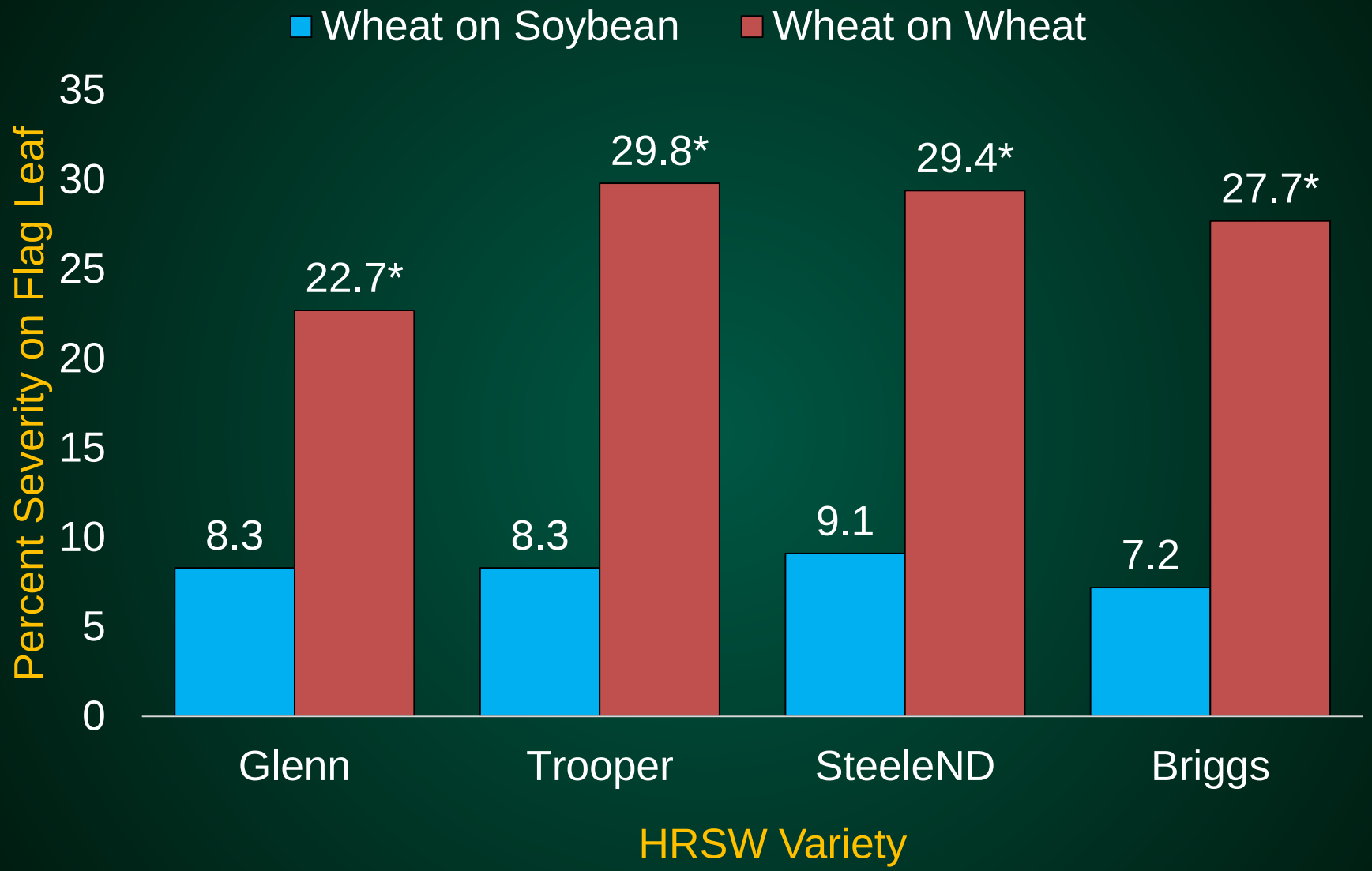
Yield means statistically different

Study conducted by R. Ashley et al. 2000

Second Study – Fungal Leaf Spots

- No-till
- Two different crop rotations
- Different varieties with no fungicides
- Red River Valley

Crop Rotation - Tan Spot - 2008



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Disease means statistically different

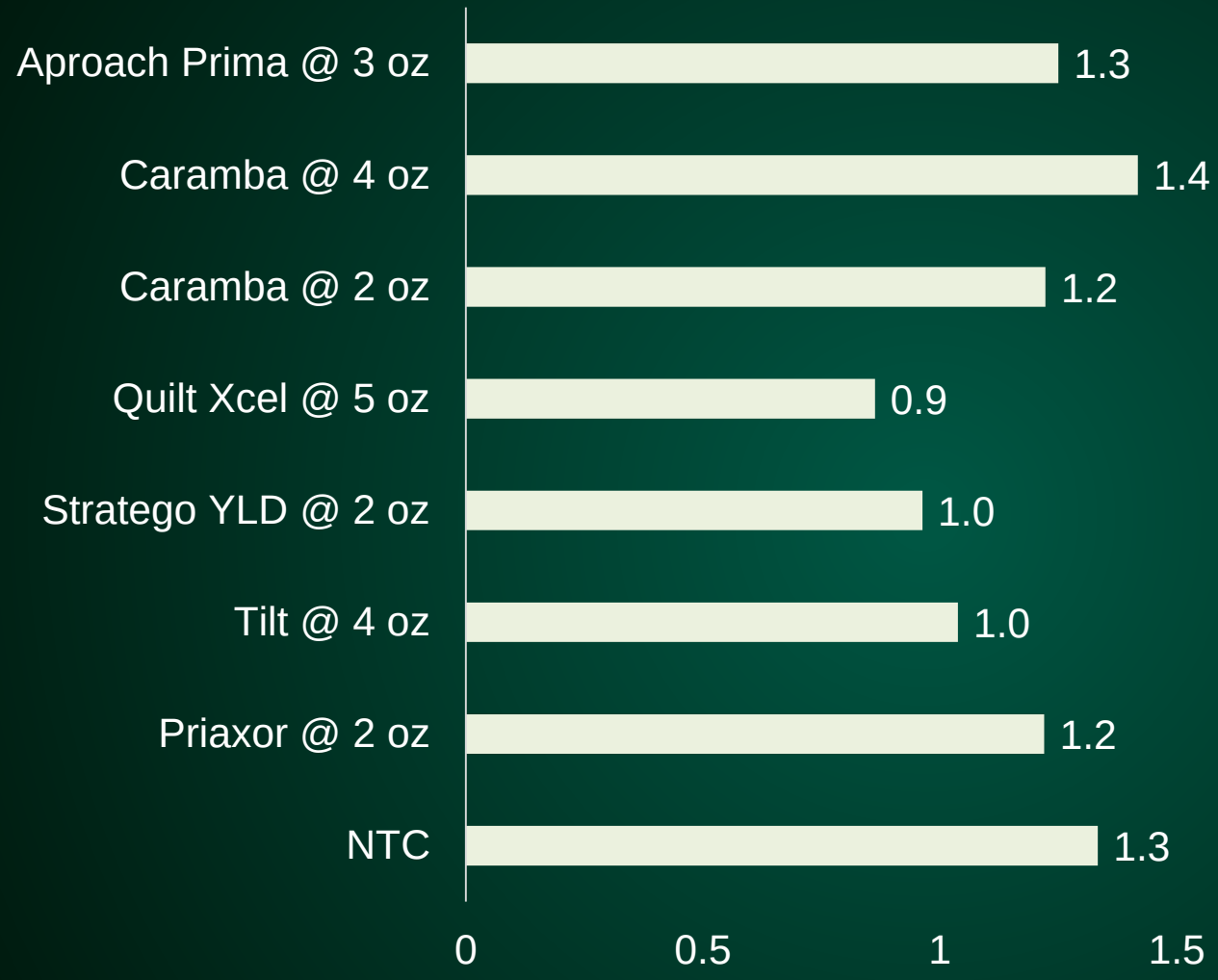
McMullen et al. 2008

Third Study – Fungal Leaf Spots

- 2014
- Chisel plowed
- Wheat after soybean
- Fungicides applied at tillering
- Red River Valley

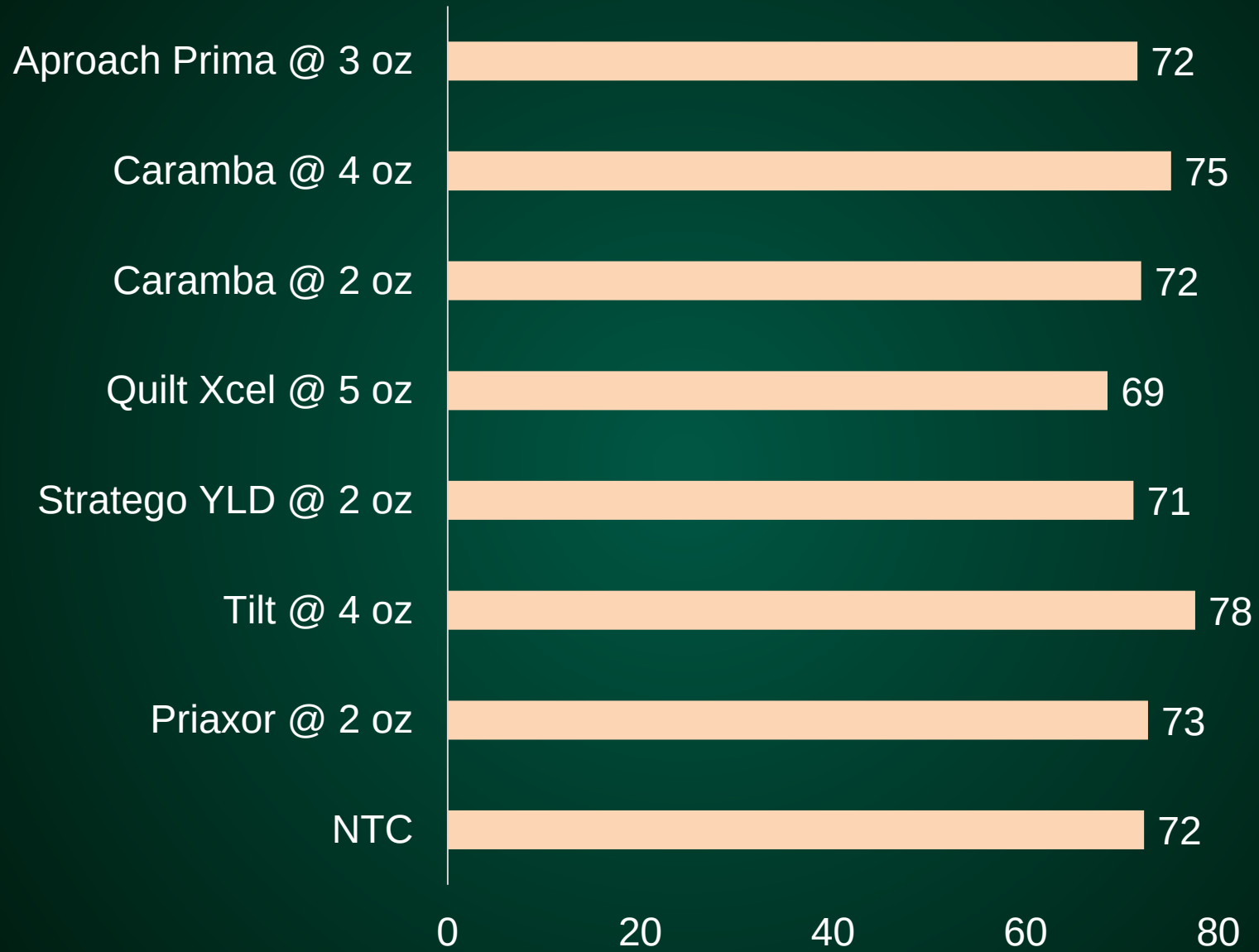
Flag Leaf Severity (%)

*Rated at soft dough



Disease means are not statistically different

Yield (bu/A)



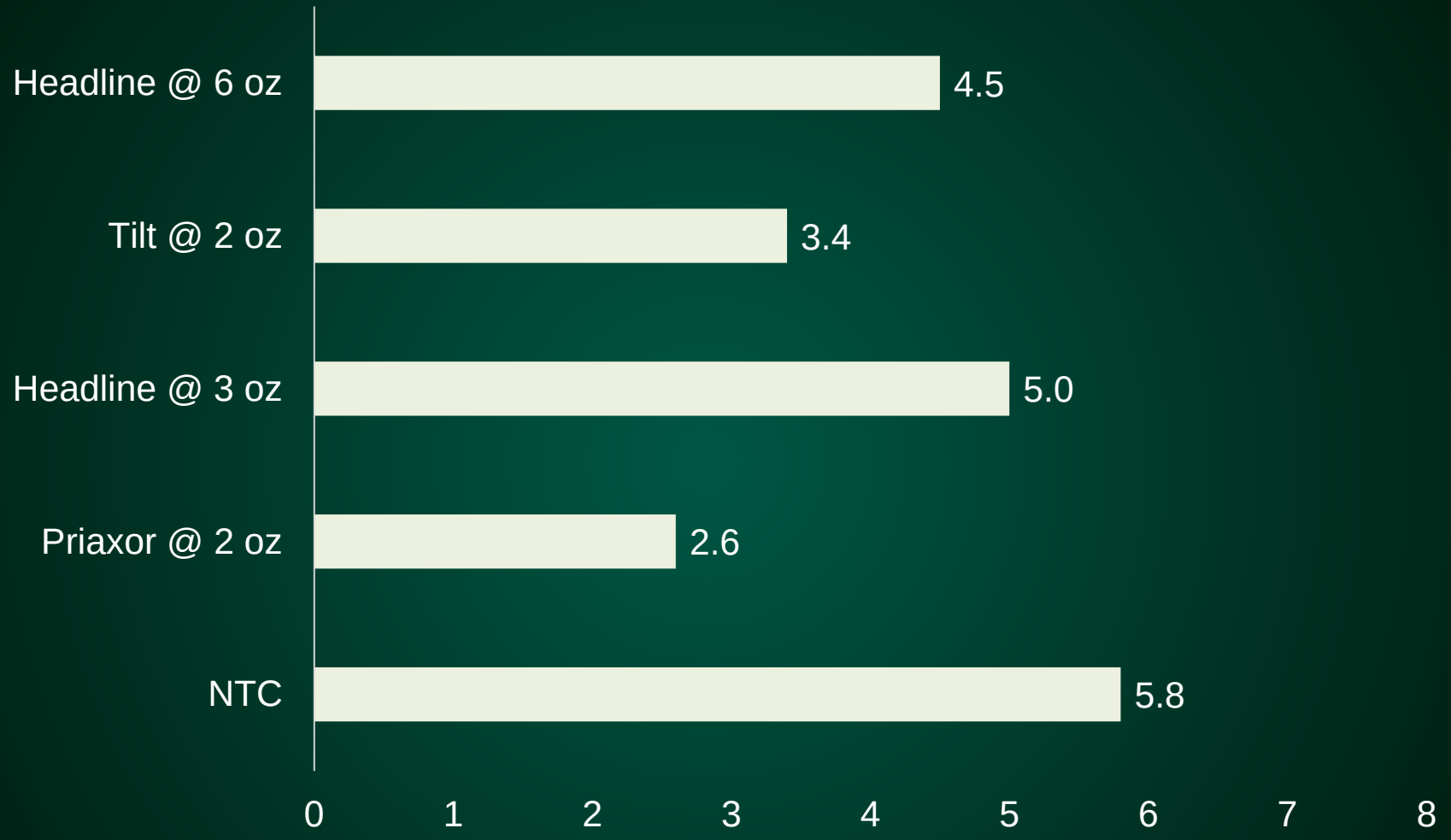
Yield means are not statistically different

Fourth Study – Fungal Leaf Spots

- 2016
- Chisel plowed
- Wheat after soybean
- Fungicides applied at tillering
- Red River Valley

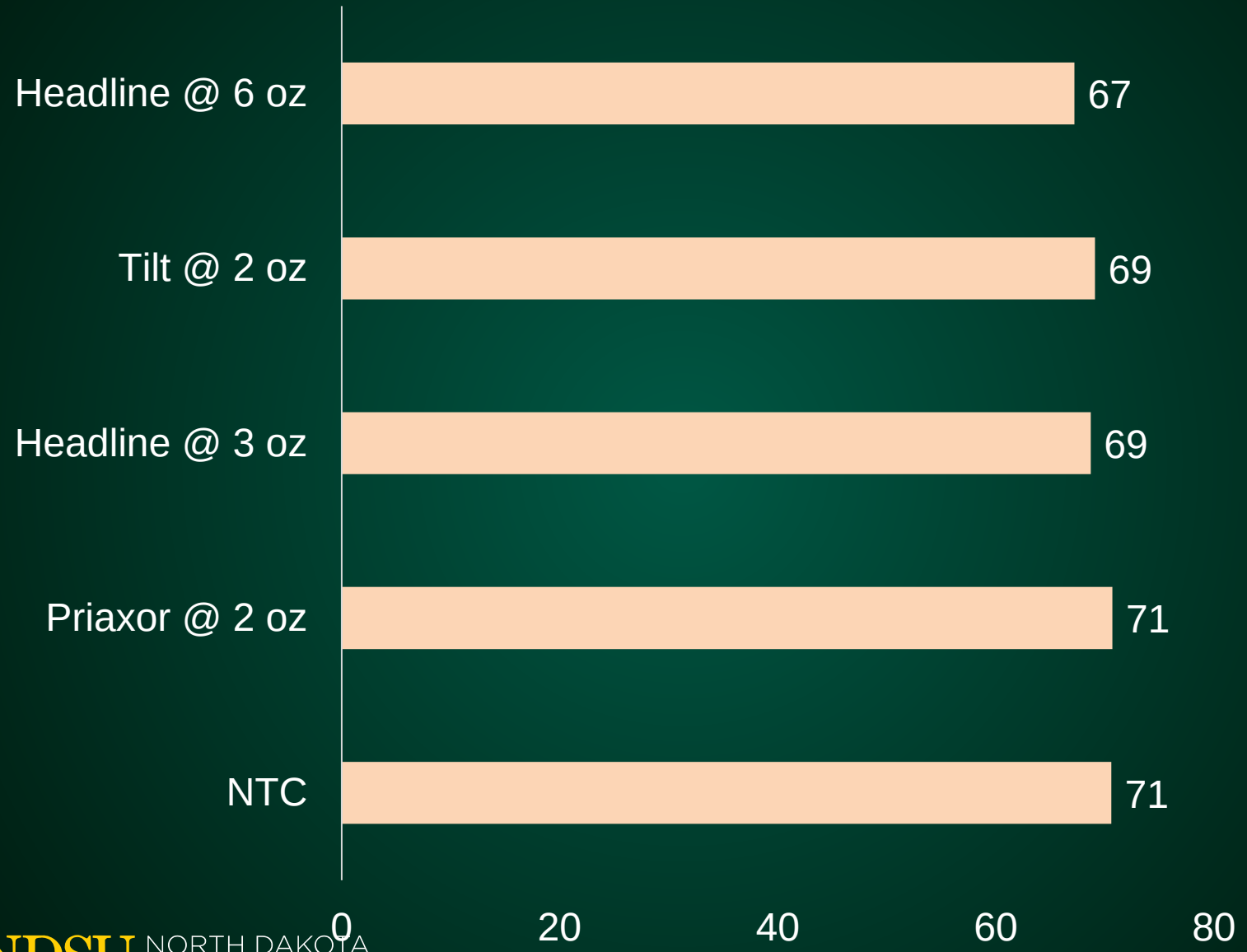
Flag Leaf Severity (%)

*Rated at soft dough



Disease means are not statistically different

Yield (bu/A)



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Yield means are not statistically different

Stripe Rust

Influence of varietal resistance and fungicide timing

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Where do the pathogens that cause leaf rust and stripe rust overwinter?

http://thempfa.org/wp-content/uploads/2017/11/us-and-canada-printable-map-map-of-the-us-and-canada-13-maps-update-830720-map-us-canada-usa-states.jpg

May 29, 2017

May 23, 2016

May 23, 2016

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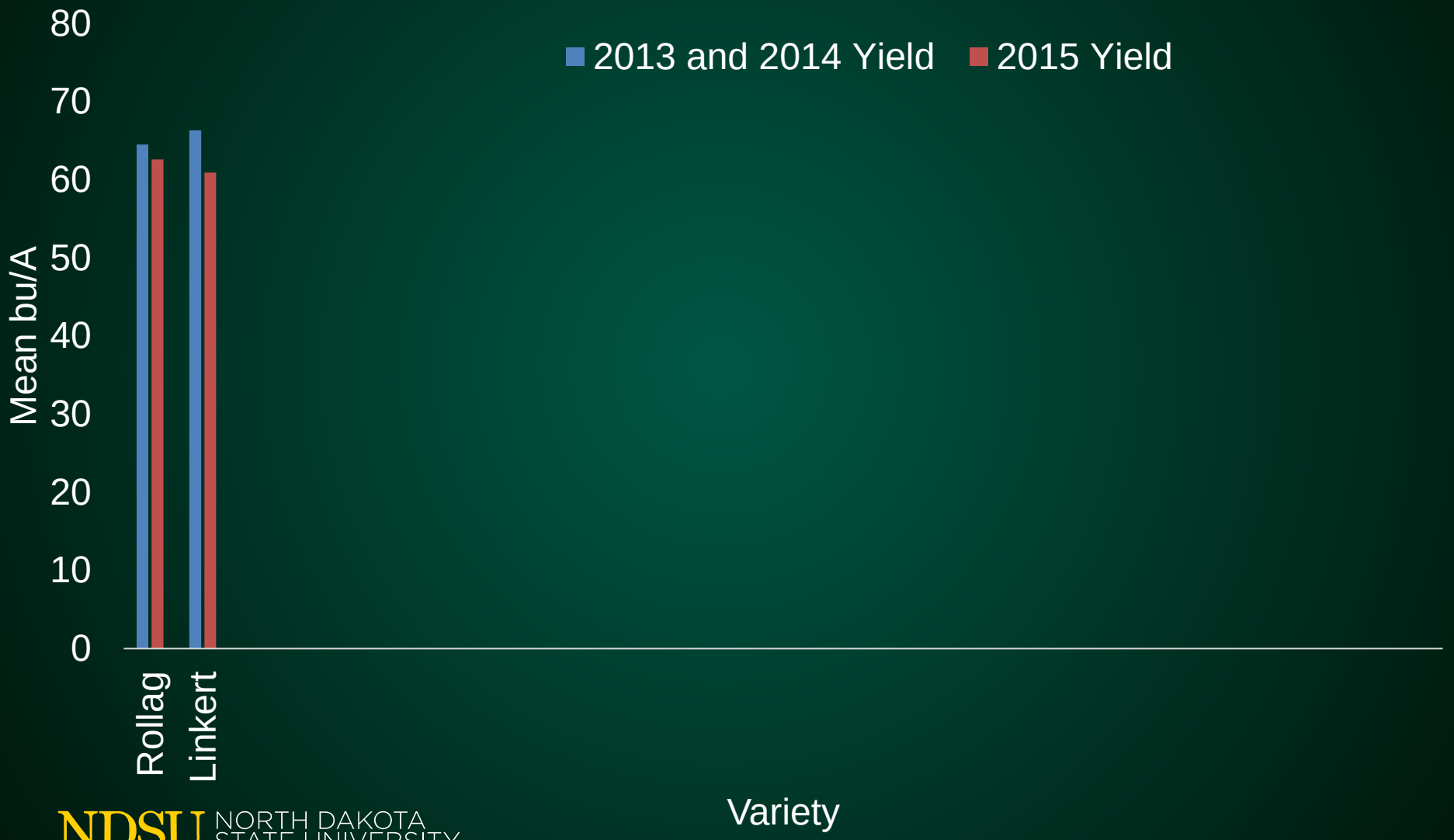
http://www.ezilon.com/maps/images/usa/north-dakota-county-map.gif

HRSW Variety Trial

- Variety trial located near Wishek in 2015
- Carrington REC manages plot
- Natural epidemic of stripe rust
- Severe levels during the flowering stages of development

Wishek Variety Trial - R



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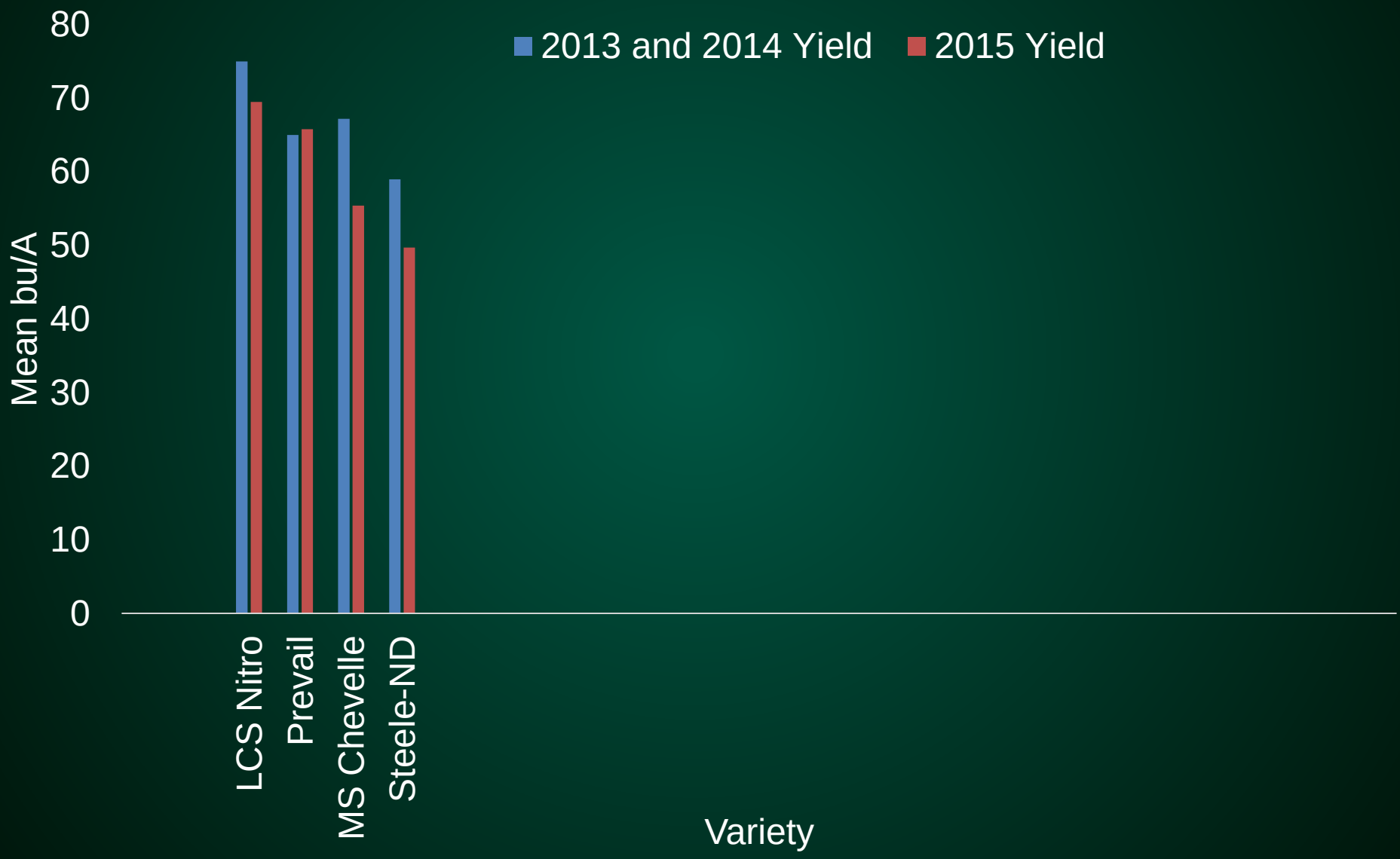
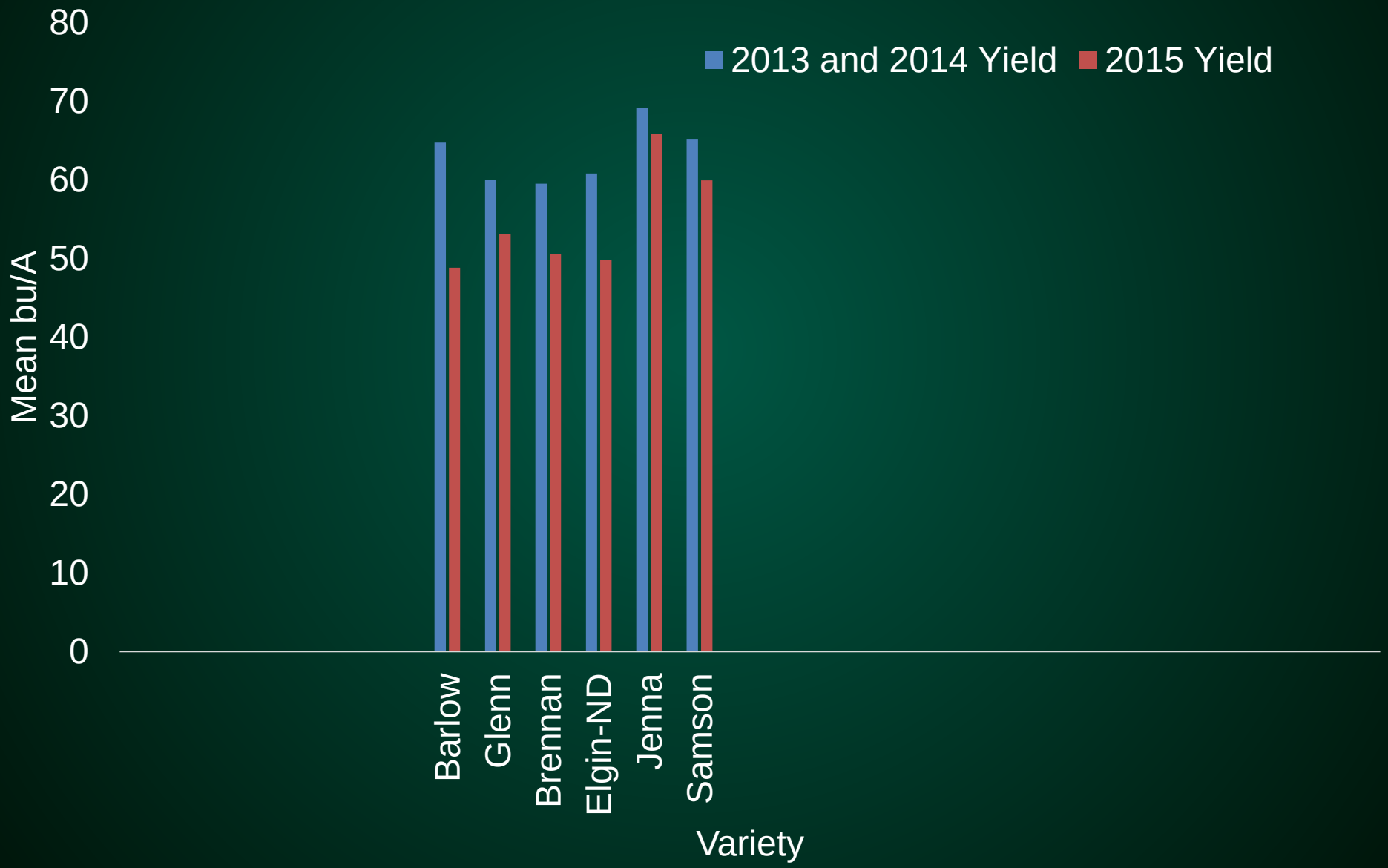
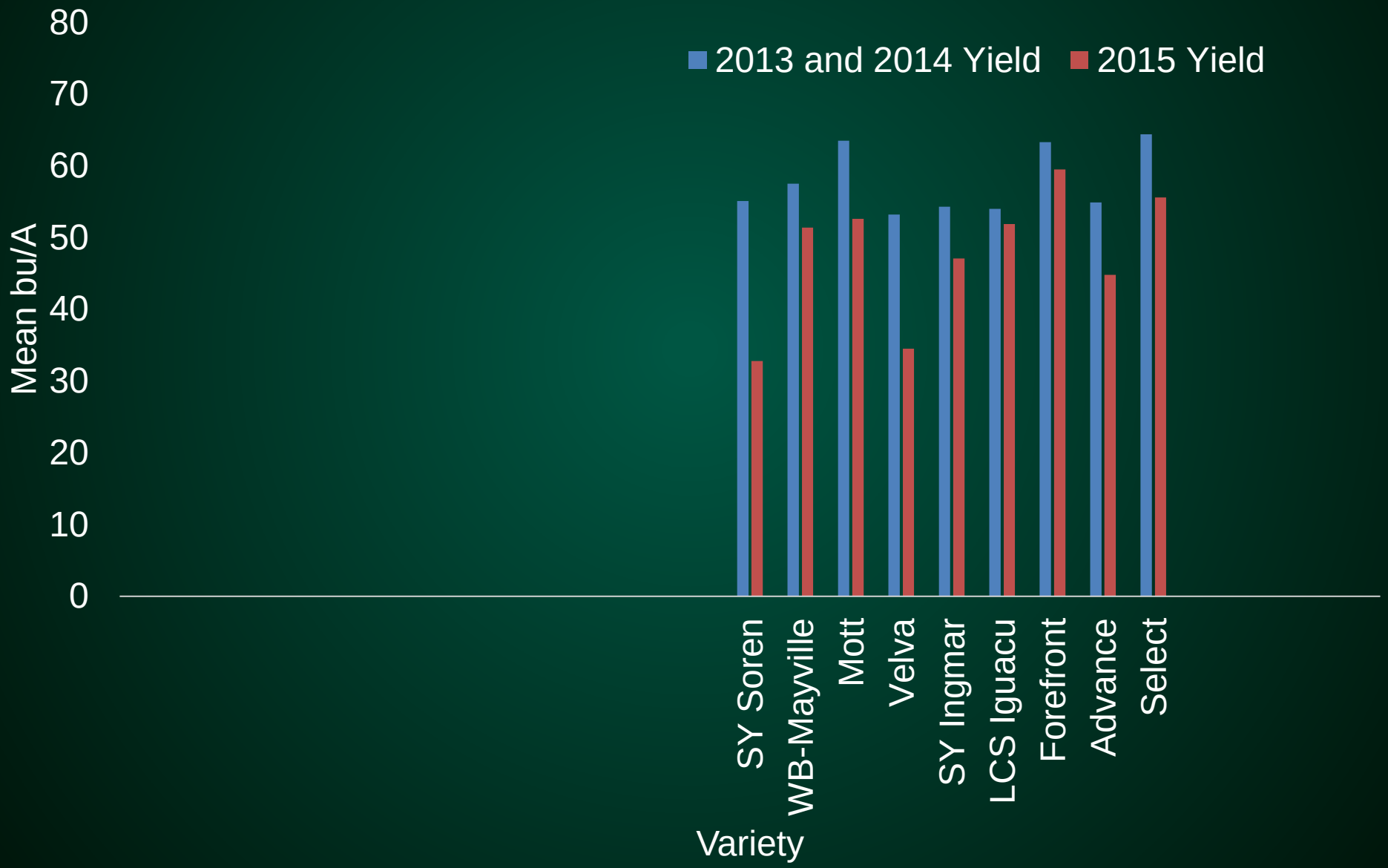
Wishek Variety Trial - MR



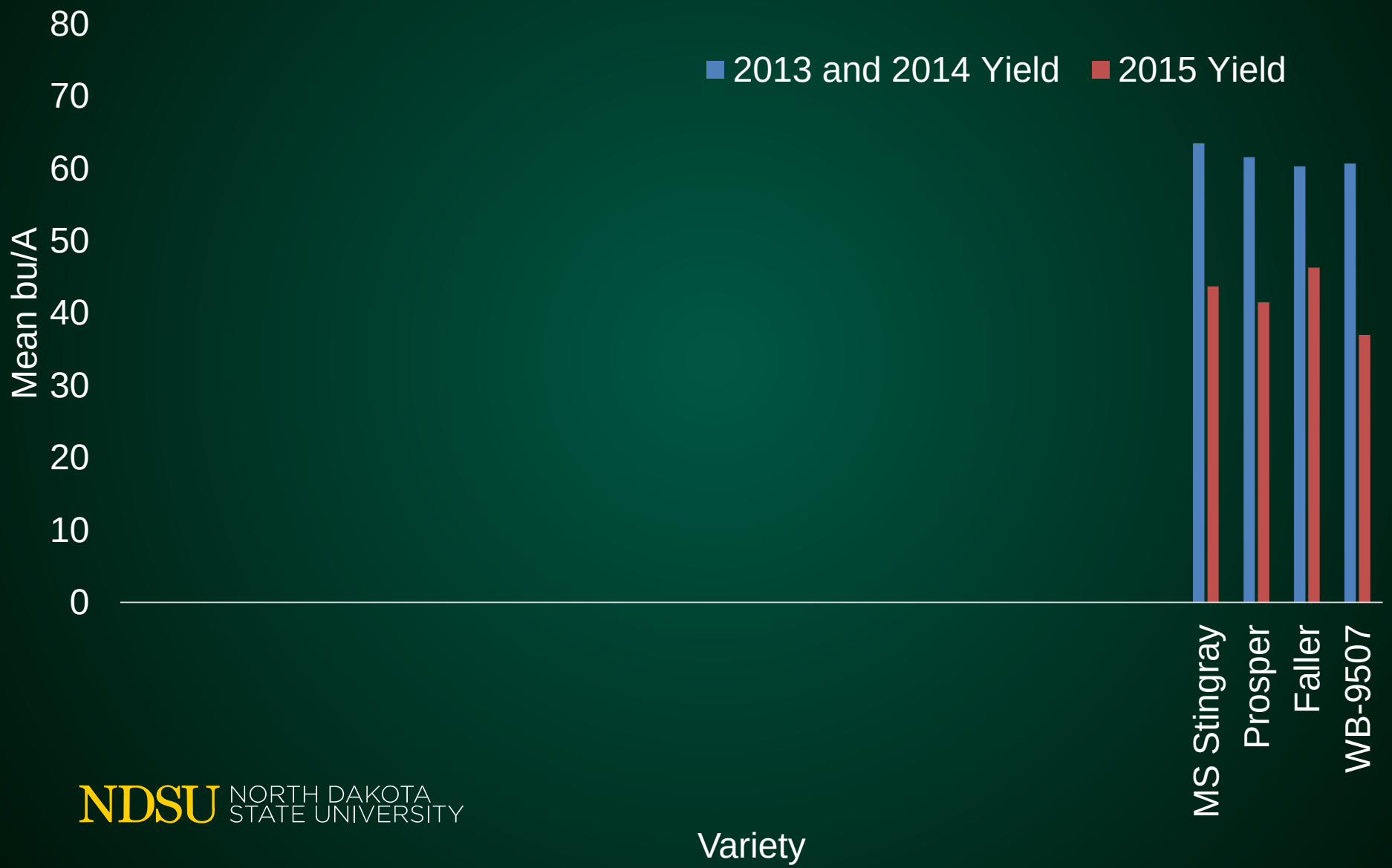
Wishek Variety Trial - M



Wishek Variety Trial - MS



Wishek Variety Trial - S



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Top 10 Varieties in ND (acreage)

Variety	Stripe Rust Reaction (1 = resistant and 9 = susceptible)
SY Ingmar	6
SY Soren	7
Linkert	1
Barlow	4
Elgin-ND	5
SY Valda	7
Glenn	4
Prosper	8
Faller	8
Bolles	5

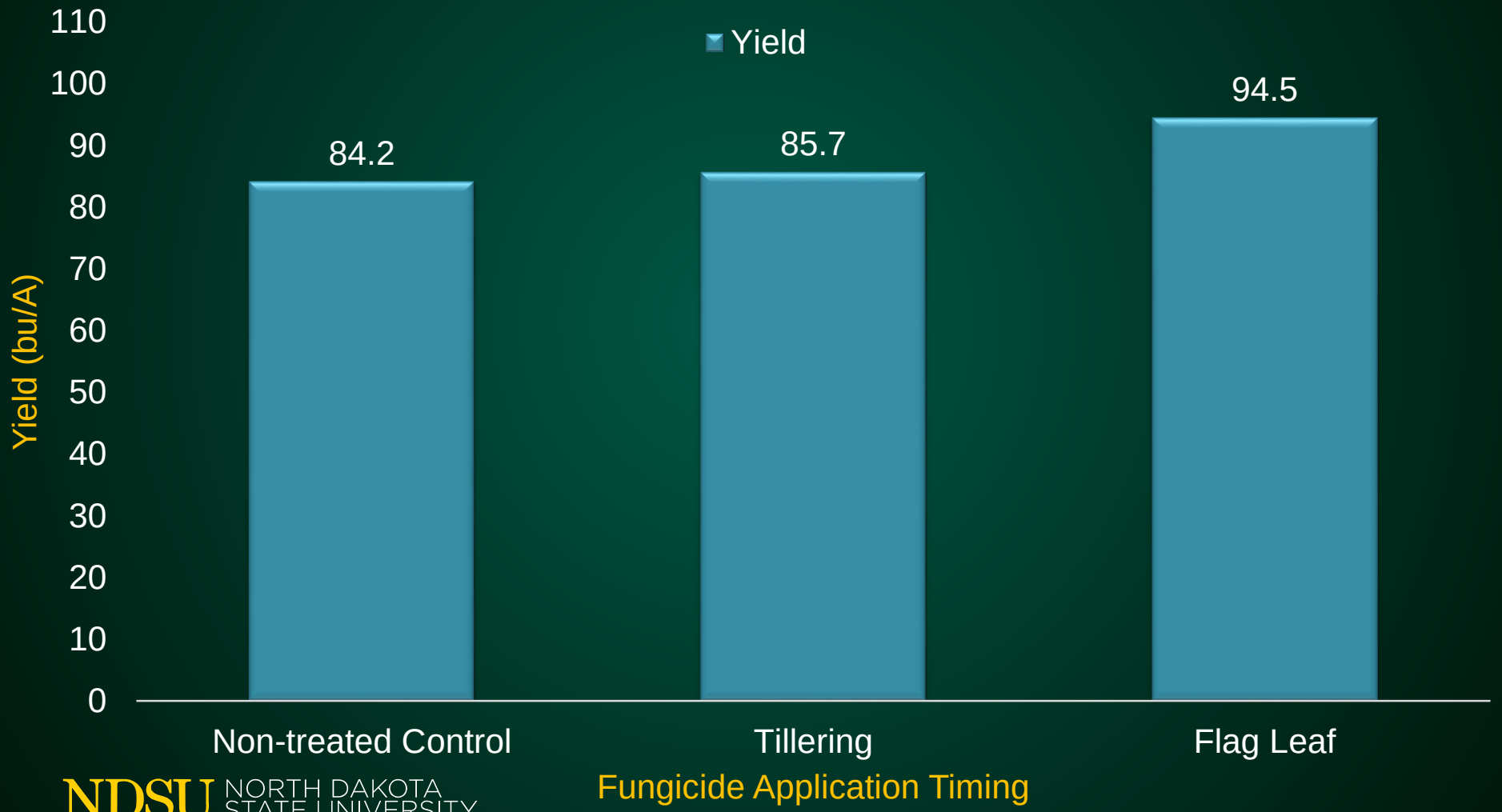
Fungicide Timing

*Data from 2015 Fargo

Fungicide Timing

*Data from 2015 Fargo, 7 trials

*High level of stripe rust, susceptible HRSW variety



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Effect of Fungicides on Yields under Varying Disease Environments

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Foliar Fungicide Timing Trials

- 2008-2015
- 59 replicated trials in Fargo
- Varying levels of disease
  1. Low Disease (few lesions on oldest leaves)
  2. Moderate Disease (Flag-1 Leaf)
  3. High Disease (Flag Leaf)

Low Disease

Very few lesions in lower canopy

Moderate Disease on Flag-1

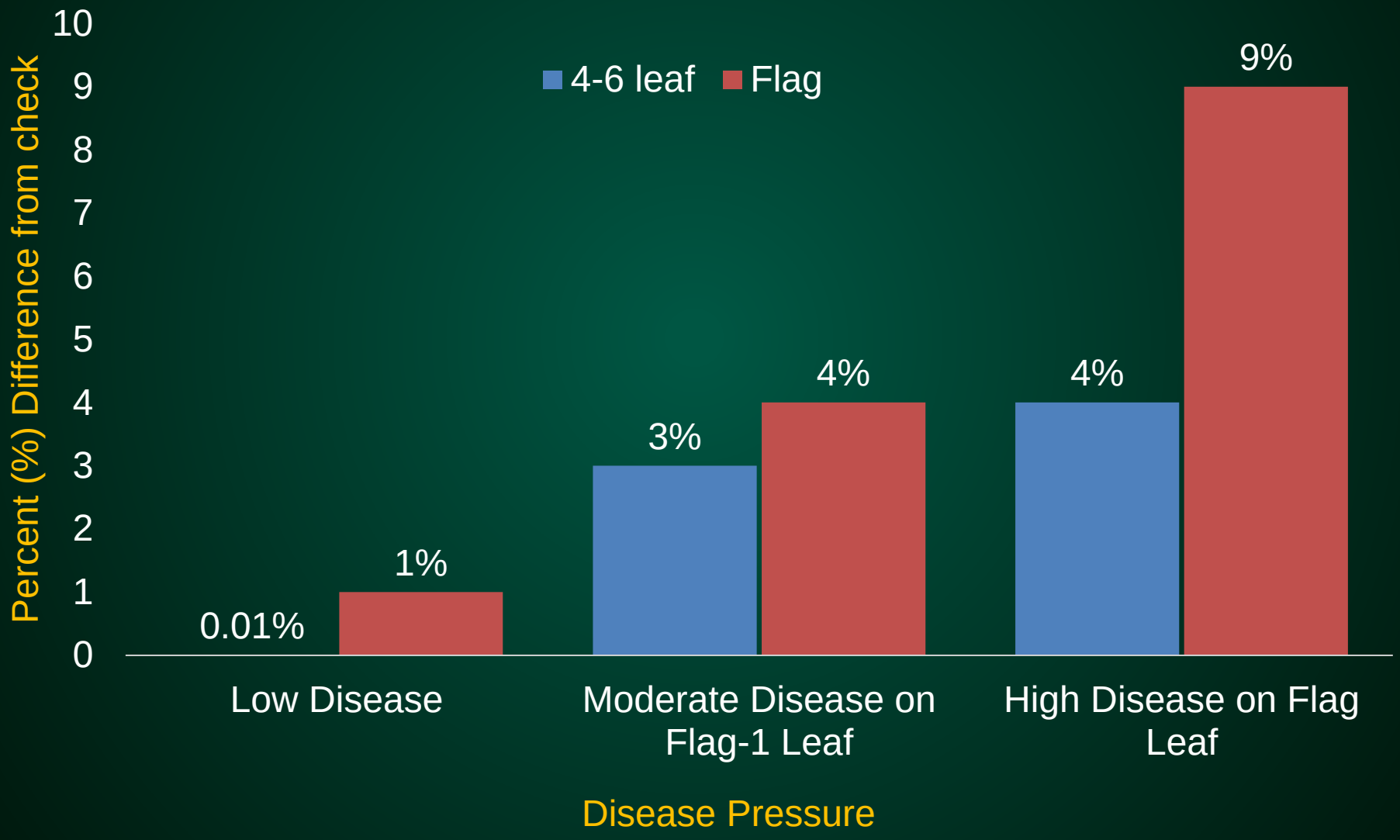
10-20% of leaf covered with lesions

High Level of Disease on Flag Leaf

Foliar Fungicide Timing Trials

- Low Disease - 13 Trials
- Moderate Disease - 26 Trials
- High Disease - 20 Trials
- Triazoles and Strobilurins
- 4-6 leaf stage and flag leaf

Fungicide Timing – Yield Response



Fungicide Timing	Disease Risk	Mean Yield Response %	Anticipated Wheat Yield			
			50 bu	60 bu	70 bu	80 bu
4-6 Leaf	Low	0.01%	0.05 bu	0.06 bu	0.07 bu	0.08 bu
4-6 Leaf	Moderate	3%	1.5 bu	1.8 bu	2.1 bu	2.4 bu
4-6 Leaf	High	4%	2.0 bu	2.4 bu	2.8 bu	3.2 bu
Flag Leaf	Low	1%	0.5 bu	0.6 bu	0.7 bu	0.8 bu
Flag Leaf	Moderate	4%	2.0 bu	2.4 bu	2.8 bu	3.2 bu
Flag Leaf	High	9%	4.5 bu	5.4 bu	6.3 bu	7.2 bu

*Based on mean values over 59 replicated trials at Fargo, ND
*Yield response may be higher or lower depending on year, environment, disease

Fusarium Head Blight Management

- No silver bullet
- Best managed using an integrated approach

What FRAC group provides the most suppression of FHB?

What FRAC group can actually increase mycotoxin levels if applied to a small grain spike?

*Fungicides provide best suppression when used on a less susceptible variety

100% Control

45-60%

- Prothioconazole (Proline)
- Metconazole (Caramba)
- Prothioconazole + Tebuconazole (Prosaro)

20-30%

- Tebuconazole (Folicur, generics)

12-20%

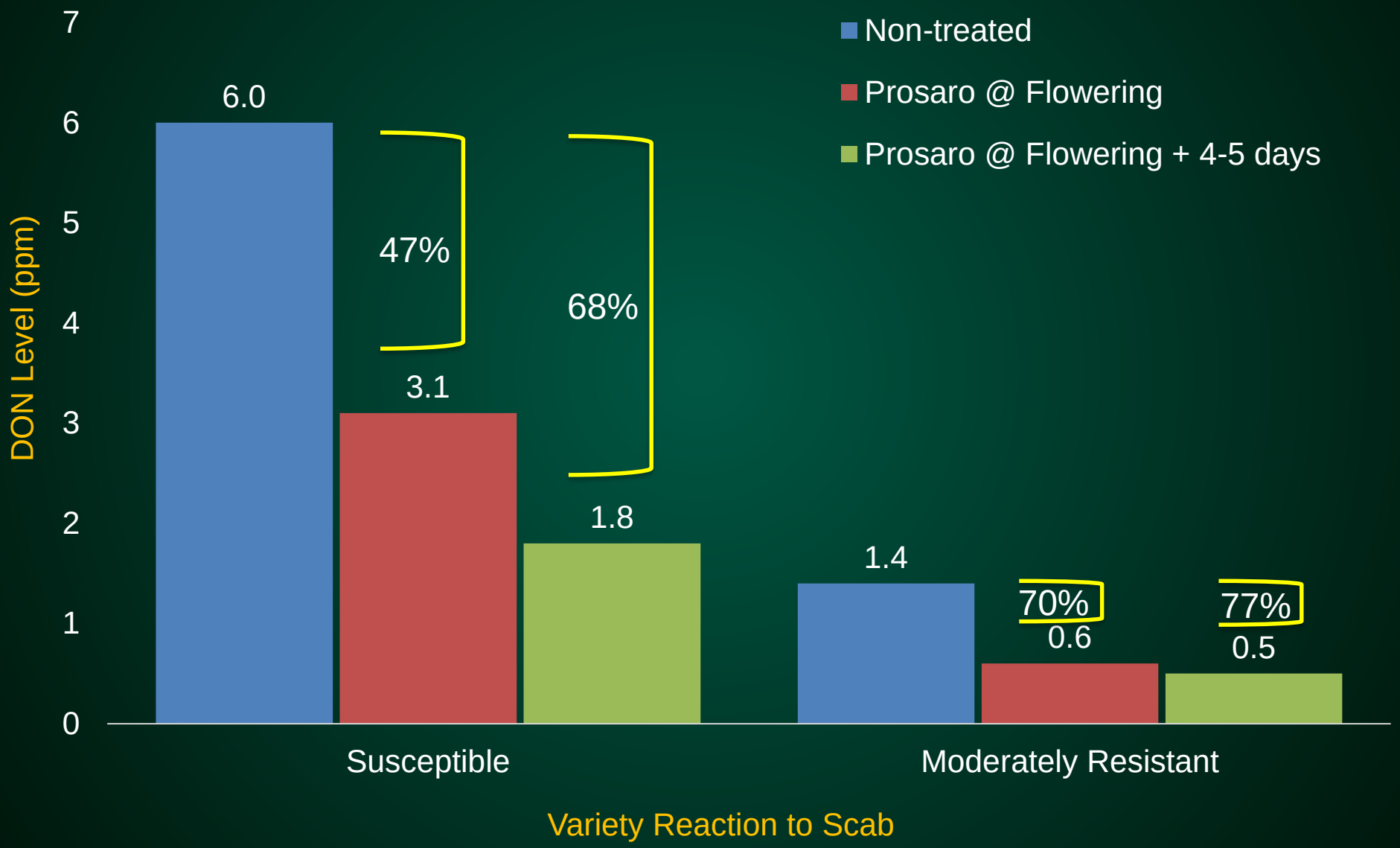
- Propiconazole (Tilt, generics)

Wheat – 50% main stems are flowering

Barley – 50% main stems are headed

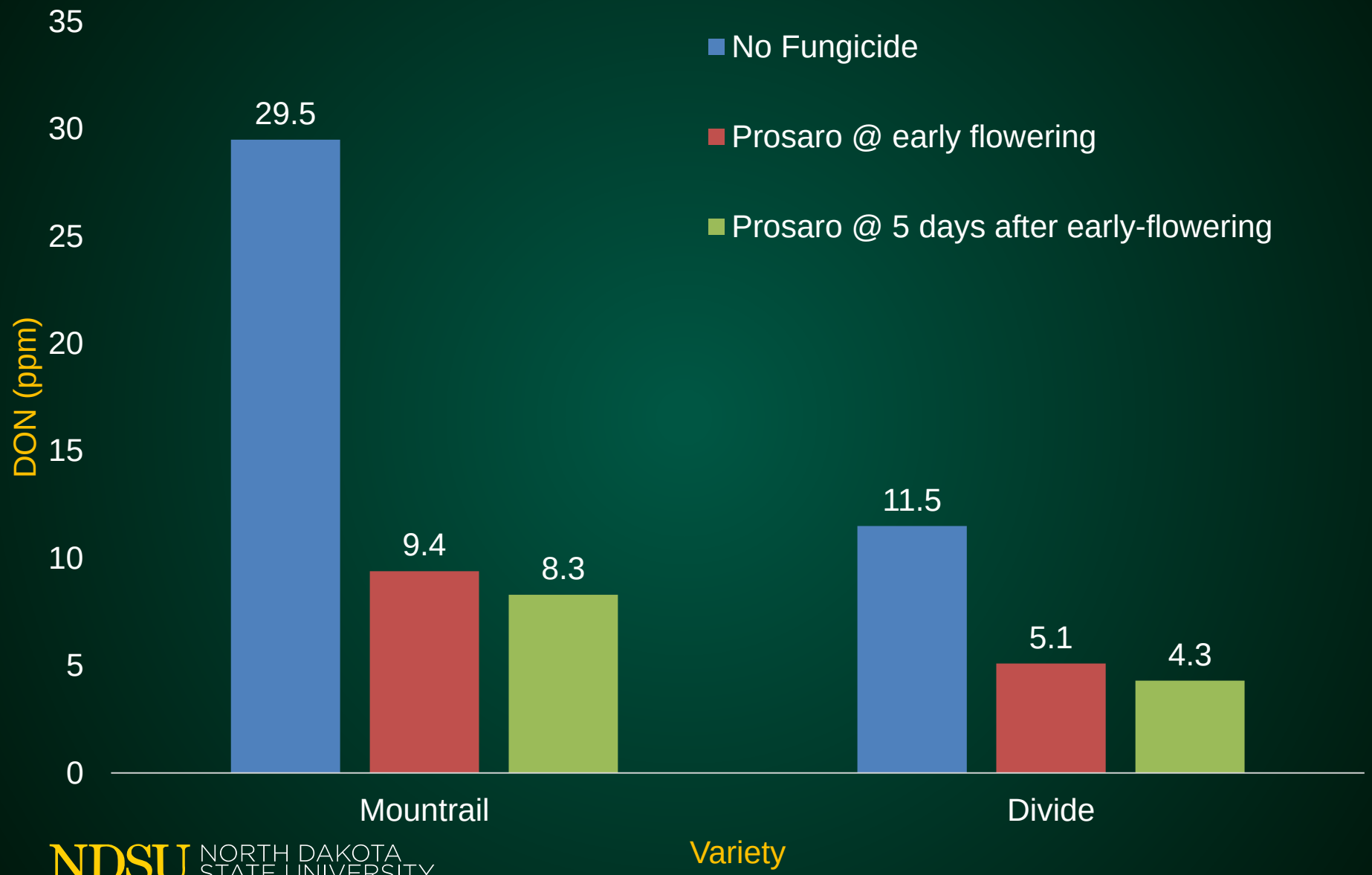
Is it better to be “too early” or “too late” when applying a fungicide for scab?

FHB - Variety by Fungicide Timing



2014 & 2015 – Fargo and LREC

Durum – FHB Trial – 14-15 Langdon



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Chapara, Friskop and Gautam, 2014

USWBSI Funded Double (Split) Fungicide Application Trials

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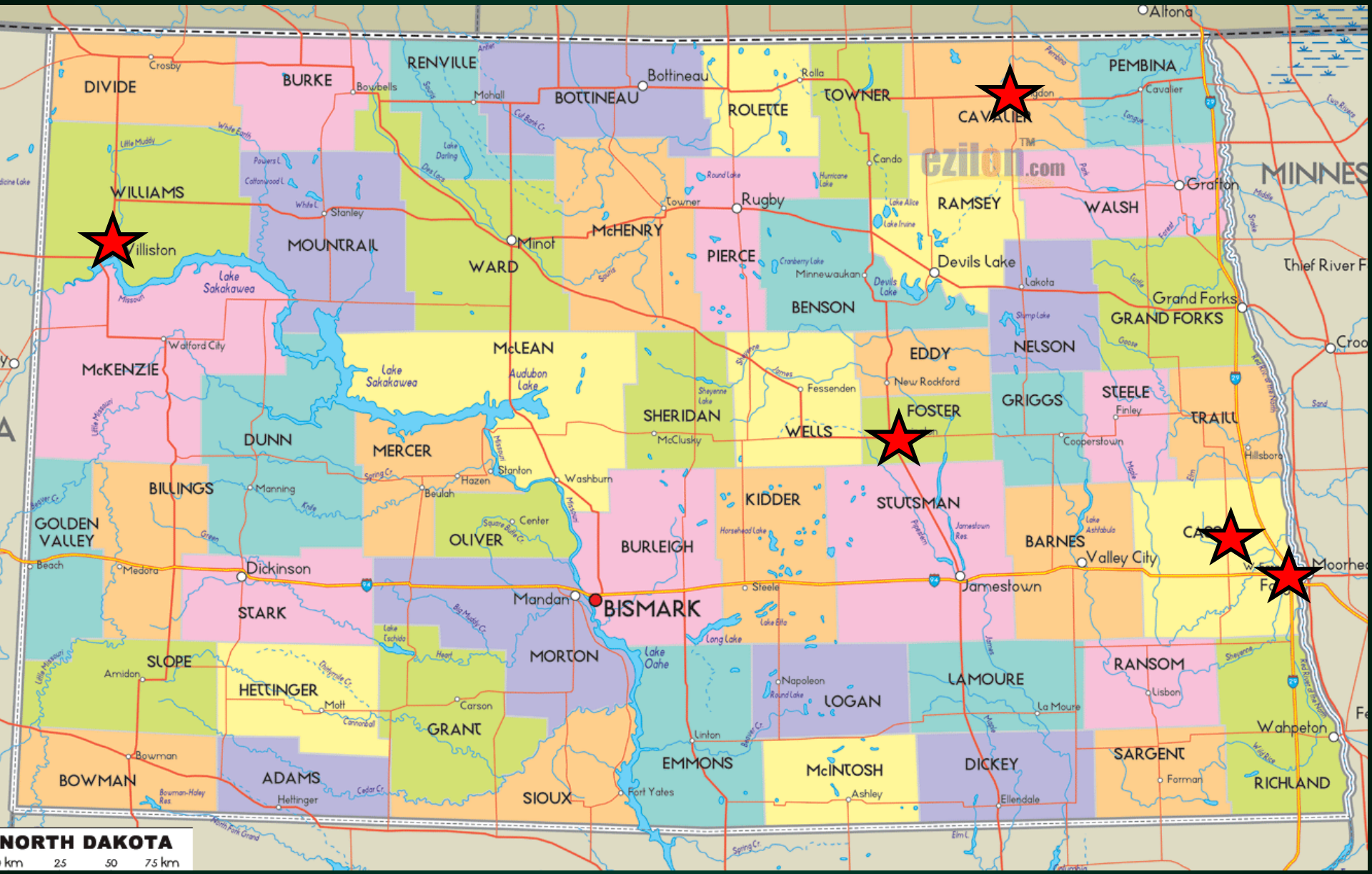

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0 km 25 50 75 km

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http://www.ezilon.com/maps/images/usa/north-dakota-county-map.gif

2016 USWBSI funded trials

#	Fungicide	Timing	DON Reduction
1	Prosaro @ 6.5 oz/A	Recommended Time	44%
2	Prosaro @ 6.5 oz	Recommended Time	64%
2	Caramba @ 14 oz/A	4-7 days later	
3	Caramba @ 14 oz/A	Recommended Time	58%
3	Tebuconazole @ 4 oz/A	4-7 days later	
4	Proline @ 5.7 oz/A	Recommended Time	64%
4	Tebuconazole @ 4 oz/A	4-7 days later	

Recommended time for wheat= early flowering; for barley = full-head

A New Fungicide For FHB?

Miravis ACE - Syngenta

- Adepidyn + Propiconazole (Tilt, generics)
- Adepidyn – FRAC 7
- Succinate DeHydrogenase Inhibitor (SDHI)
- Commercially available in 2019

Fungicide Trial – Durum – Fargo - DON

Fungicide Trial – HRSW – LREC - DON

From Venkat Chapara, LREC

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Summary

- Wheat diseases can appear in dry and wet environments
- Explore all management tools
- Fungicides are most effective when disease is present
- FHB fungicide application may have a wider window
- New fungicide will be effective addition for FHB