

Barley Diseases and Management

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U.S. Wheat & Barley
Scab Initiative

MICHIGAN STATE
UNIVERSITY | Extension



Foliar Diseases – Blotches



(NDSU)

Net Blotch
Pyrenophora teres



Spot Blotch
Bipolaris sorokiniana

Figure 1. Net blotch of barley. Notice lesion with net-like pattern.

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Foliar Diseases

Scald

Rhynchosporium commune



Figure 4. Barley leaf with scald. Notice tan to bleach white center and well defined brown margin (Photo credit – Marcia McMullen)

Foliar Diseases – Rusts

Leaf Rust

Puccinia hordei



Stripe Rust

Puccinia striiformis f. sp. *tritici*



Stem Rust

Puccinia graminis f. sp. *tritici*



Foliar and Head Disease



Powdery Mildew

Blumeria graminis f. *sp. hordei*

Head Disease

Fusarium head blight

- *a.k.a head scab*

Can lead to the mycotoxin

DON a.k.a vomitoxin



Growth stages of small grains

adapted from the University of Illinois

tillering

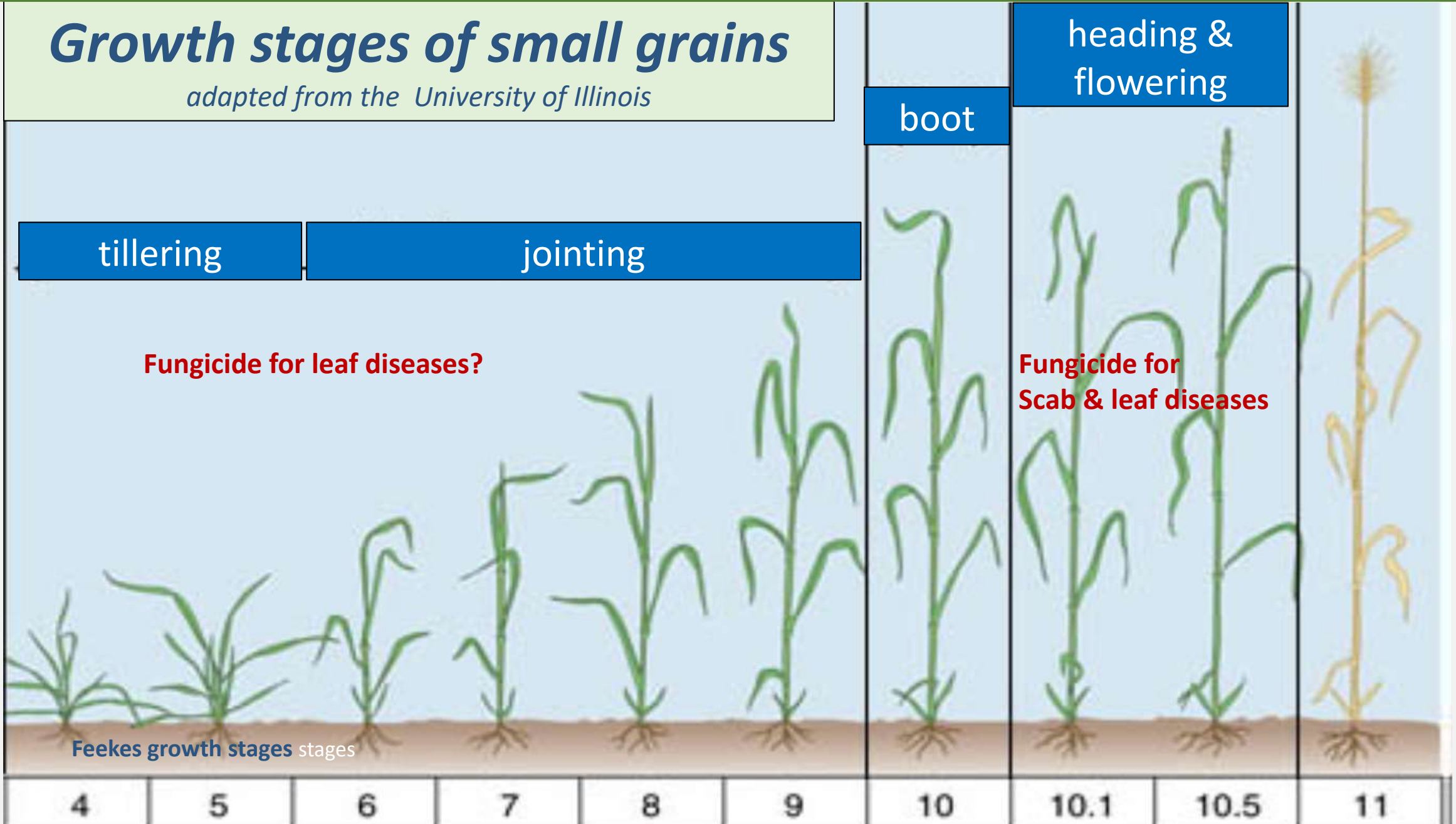
jointing

boot

heading & flowering

Fungicide for leaf diseases?

Fungicide for Scab & leaf diseases



Feekes growth stages stages

4

5

6

7

8

9

10

10.1

10.5

11

Disease Management

- Rotation
- Varietal sensitivity
- Fungicides



- For leaf diseases:
 - Propiconazole
 - Delaro
 - Trivapro
 - Nexicor
 - *others*
- For leaf disease and head scab:
 - Prosaro
 - Caramba
 - Miravis Ace

Barley Trials Thumb Region

2015 - 2018



Response of spring barley to fungicide at heading, 2015



Yield response of winter barley

Thumb, 2016

nontiled, marginal soil



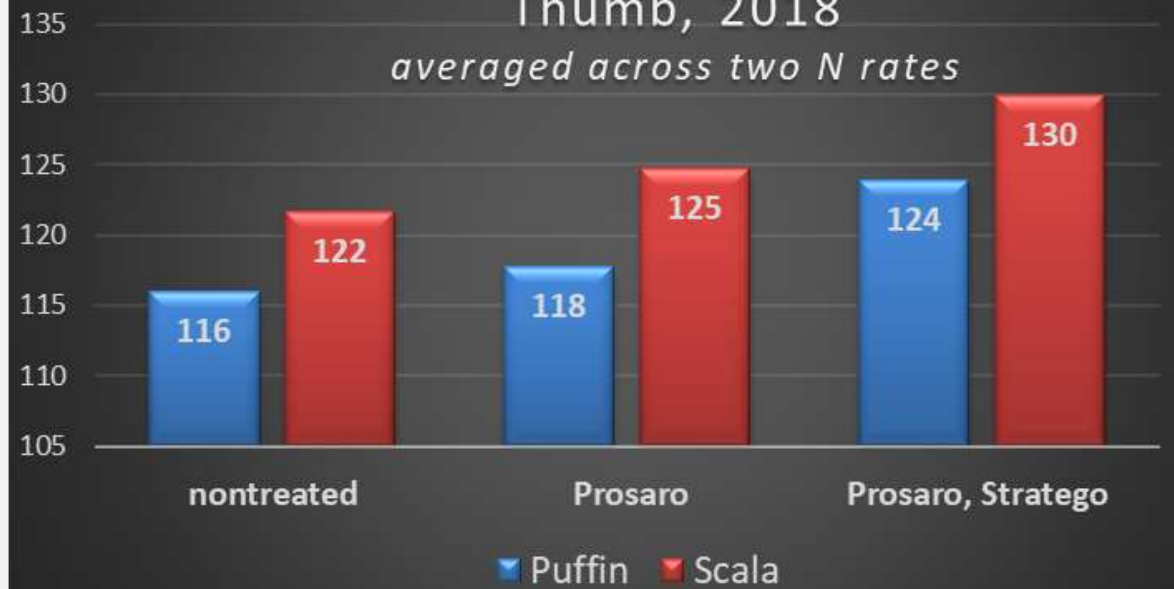
Yield response of winter barley Thumb, 2017

averaged across two N rates



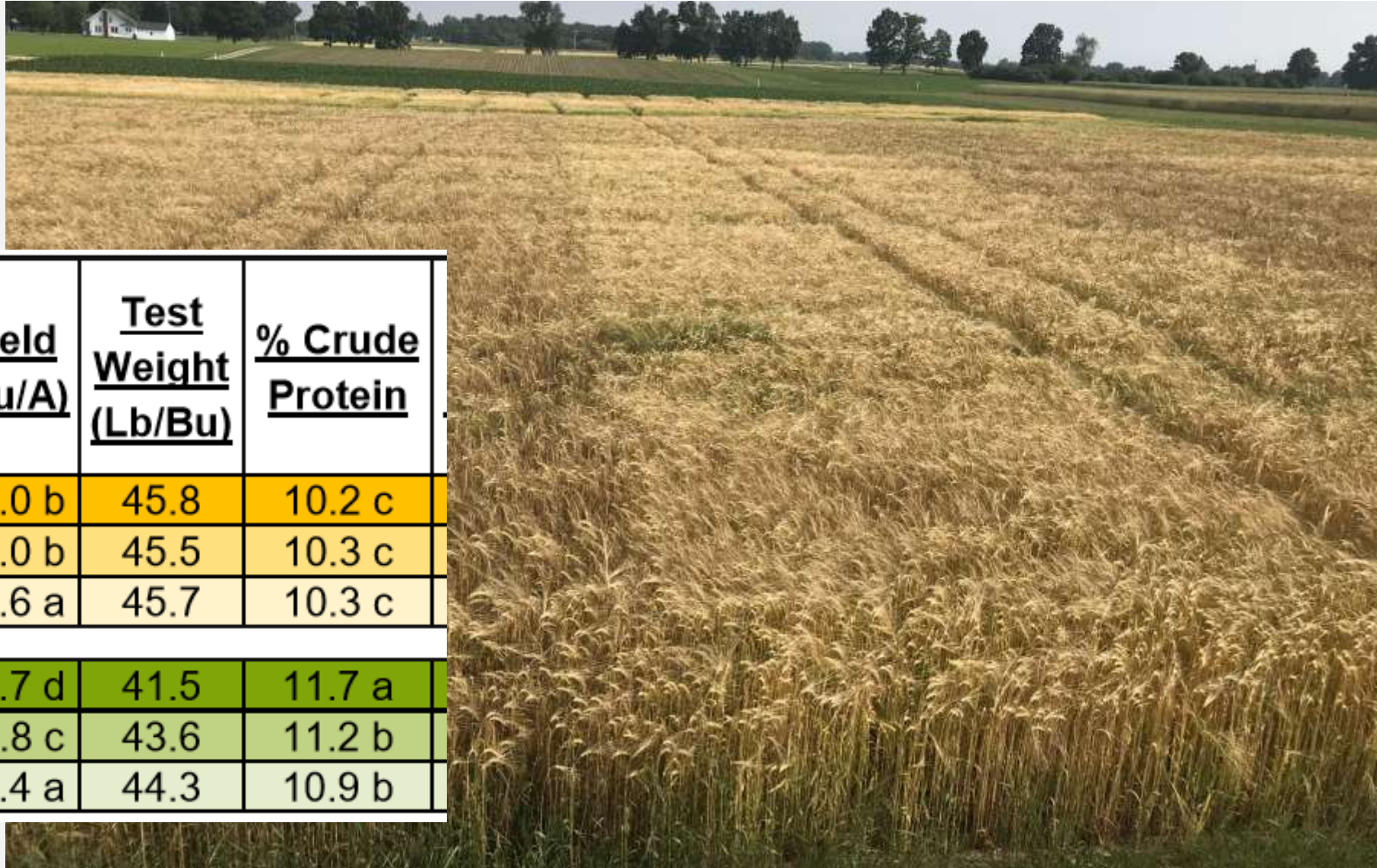
Yield response of winter barley, Thumb, 2018

averaged across two N rates



Response of Winter Barley to Fungicides

Brook Wilke et al
Kellogg Biological Station, 2019



| <u>Winter Barley Variety</u> | <u>Fungicide Treatment</u> | <u>Yield (Bu/A)</u> | <u>Test Weight (Lb/Bu)</u> | <u>% Crude Protein</u> |
|------------------------------|----------------------------|---------------------|----------------------------|------------------------|
| Puffin | Control | 55.0 b | 45.8 | 10.2 c |
| Puffin | Prosaro® | 58.0 b | 45.5 | 10.3 c |
| Puffin | Miravis® Ace | 68.6 a | 45.7 | 10.3 c |
| Calypso | Control | 28.7 d | 41.5 | 11.7 a |
| Calypso | Prosaro® | 40.8 c | 43.6 | 11.2 b |
| Calypso | Miravis® Ace | 64.4 a | 44.3 | 10.9 b |

Managing Fusarium head scab of malting barley

Fusarium head blight (FHB), commonly called head scab, is one of the most significant threats to the successful production of malting barley in Michigan. The disease can reduce yield through sterility of individual florets and by the deterioration of infected kernels. The most significant financial loss, however, stems from the production of a mycotoxin created by the fungus called deoxynivalenol (DON or vomitoxin). In the malting barley market, grain is often rejected or its value severely discounted where DON levels exceed 1 ppm.



FHB infected florets
(photo by A. Elsas)

Weather has the greatest influence on disease development. Damp conditions and moderately warm temperatures at the time of heading are most advantageous to the pathogen. However, it is also favored to a lesser extent by wet weather several days prior to heading, as it encourages spore production and dissemination. Likewise, wet conditions following heading can compound the problem as it favors both disease development and the production of DON.

Selecting varieties having the least susceptibility to scab is a critical part of reducing the risk of FHB. The level of susceptibility of any given variety should be available from breeders or seed dealers. Currently, Michigan State University is independently assessing the susceptibility of barley varieties and will eventually be able to share data on the characteristics of various malting barley varieties including their susceptibility to FHB.

Crop rotations matter, as residues from the previously infected crop can harbor the Fusarium fungus and, thereby, increase the chance for infection. The greatest risk is where barley follows corn. However, barley following wheat, hay crops or another barley crop can also elevate the risk of FHB. Using tillage to completely incorporate the residue from these crops will reduce the amount of inoculum generated within the field, although the risk of Fusarium spores from outside the immediate field remains.



Infected kernels may be shriveled and appear bleached or pinkish in color, and eventually may take on a sooty appearance (photo by P. Schwarz, NDGL)

Fungicide use is encouraged as it may reduce the severity of FHB by 20 to 30 percent and DON levels by 40 to 60 percent, although the actual reductions are highly variable. Using recommended fungicides also tends to boost yields by significantly reducing the severity of various leaf diseases that often attack barley. To improve an application's effectiveness against FHB:

Timing for head scab treatment



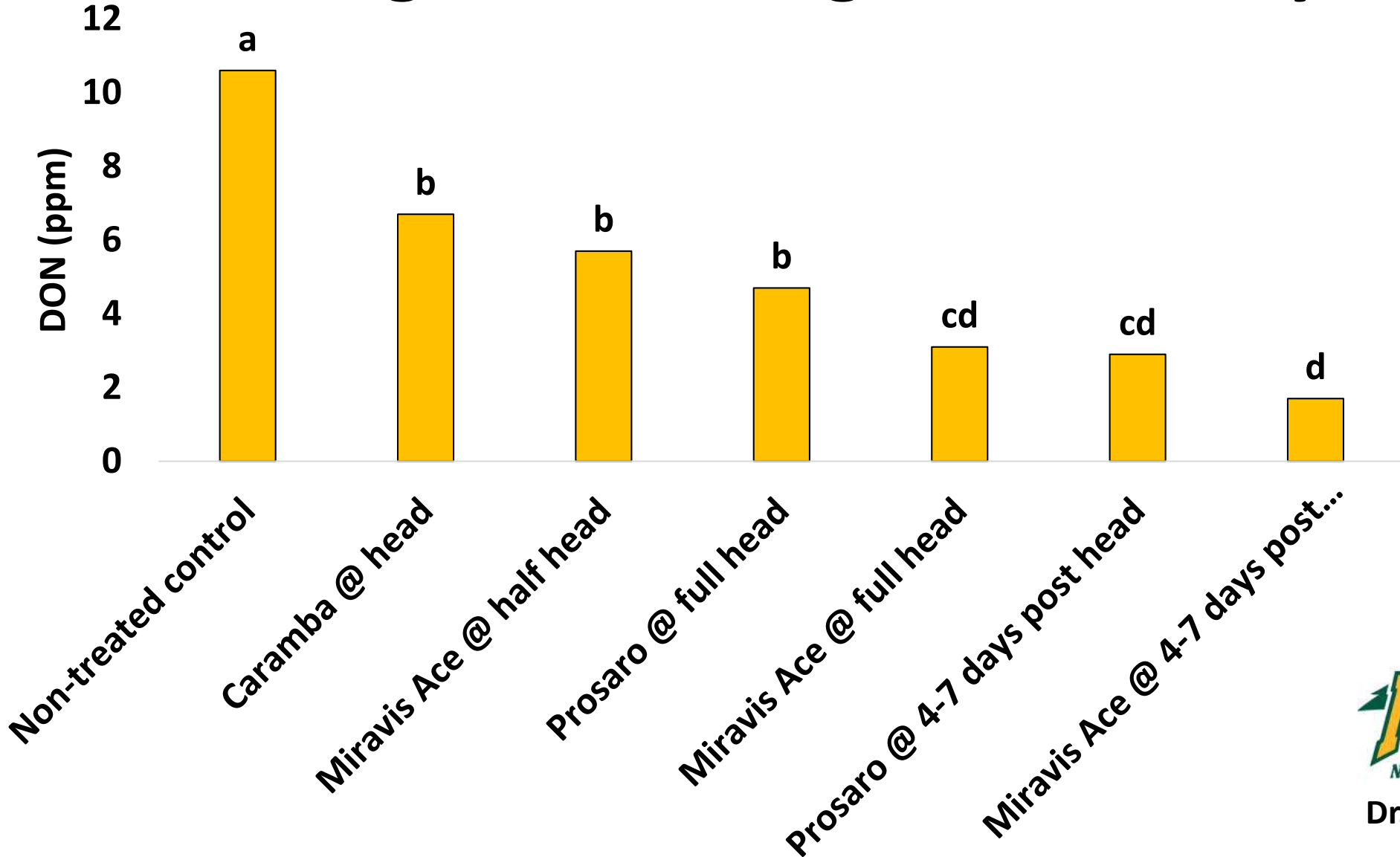
Integrated Management Barley

- Conducted in 2018 and 2019
- Two Locations (North Dakota)
- Two varieties at each location
- Data combined and analyzed PROC GLIMMIX



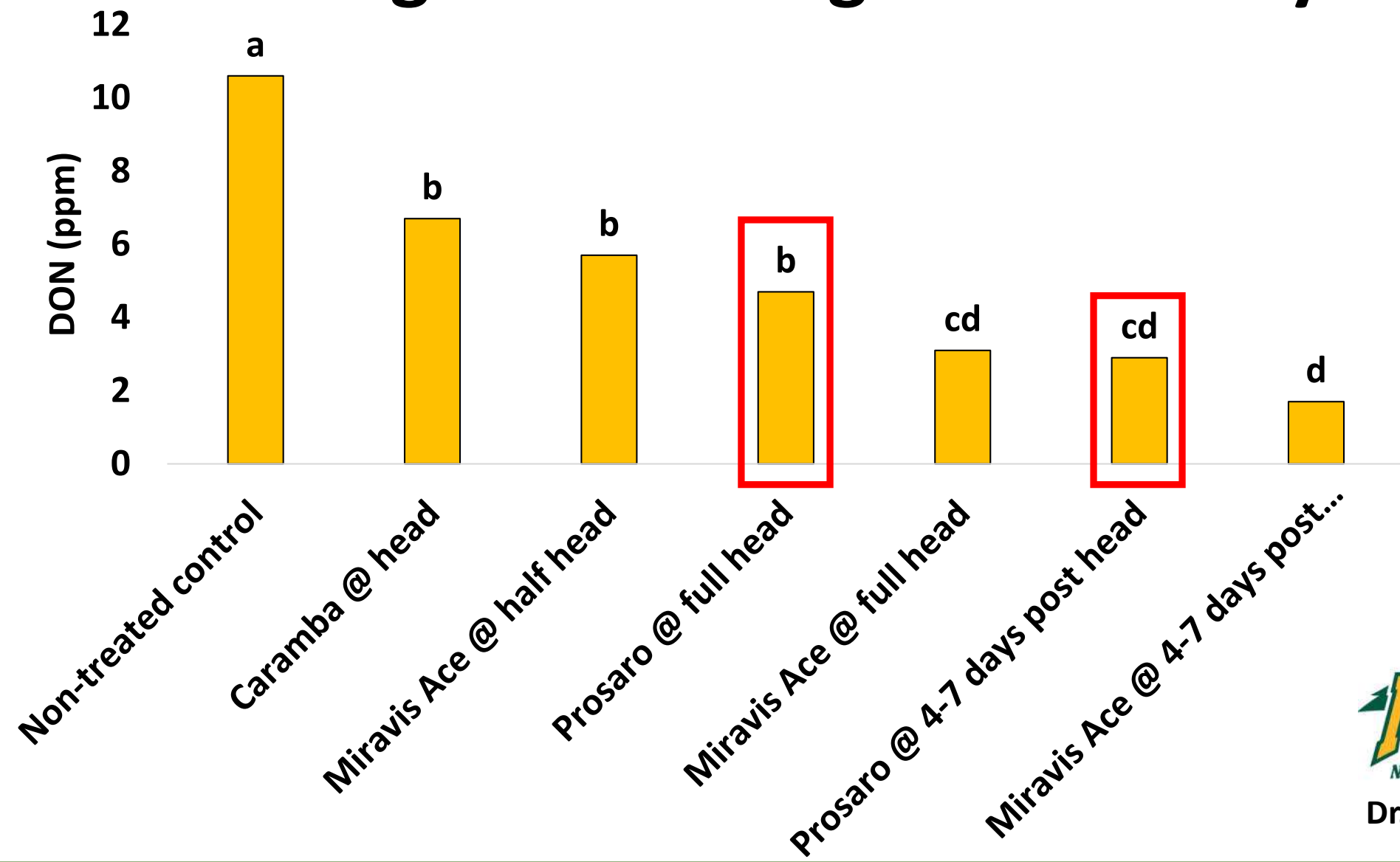
Dr. Andrew Friskop

Integrated Management Barley



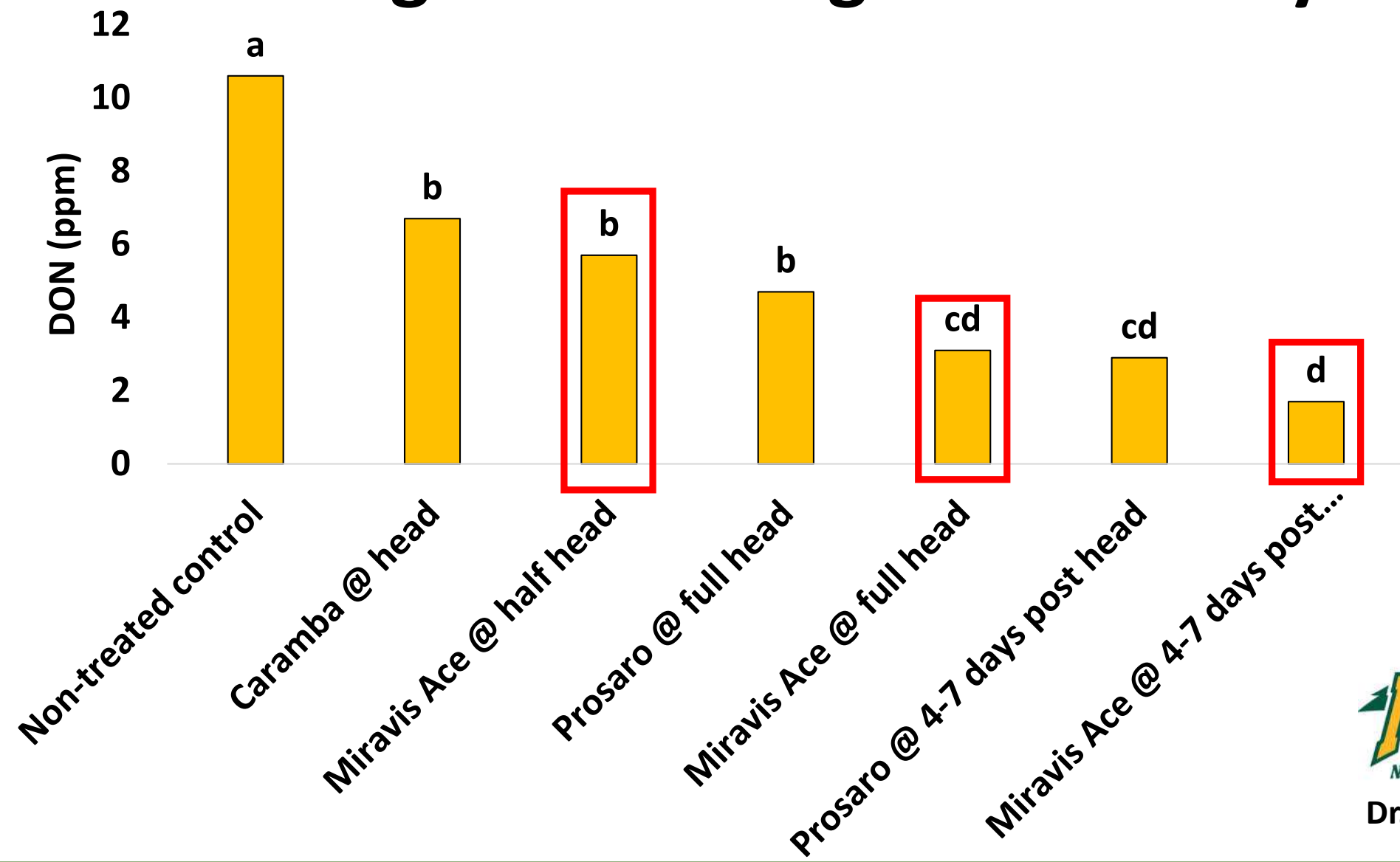
Dr. Andrew Friskop

Integrated Management Barley



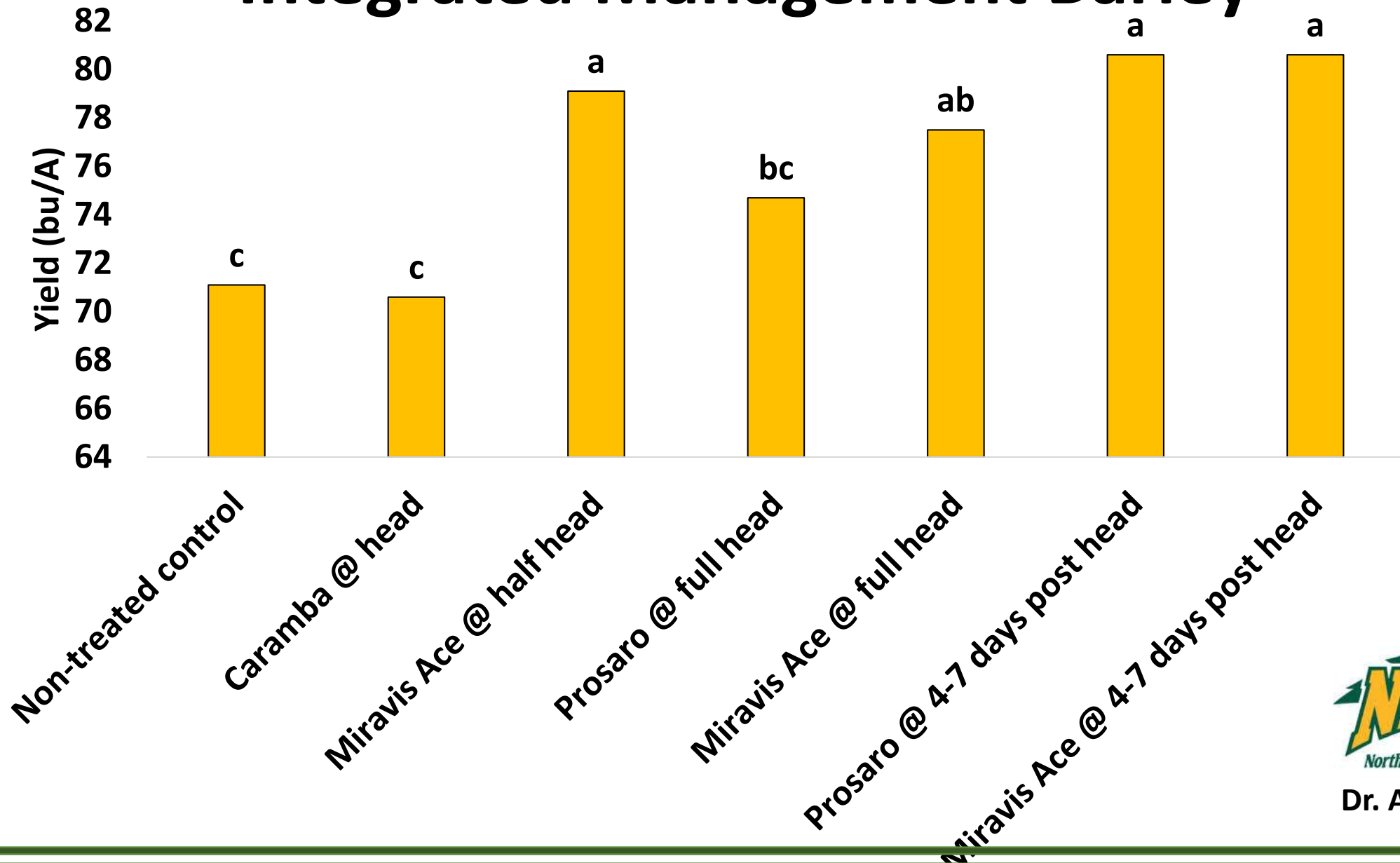
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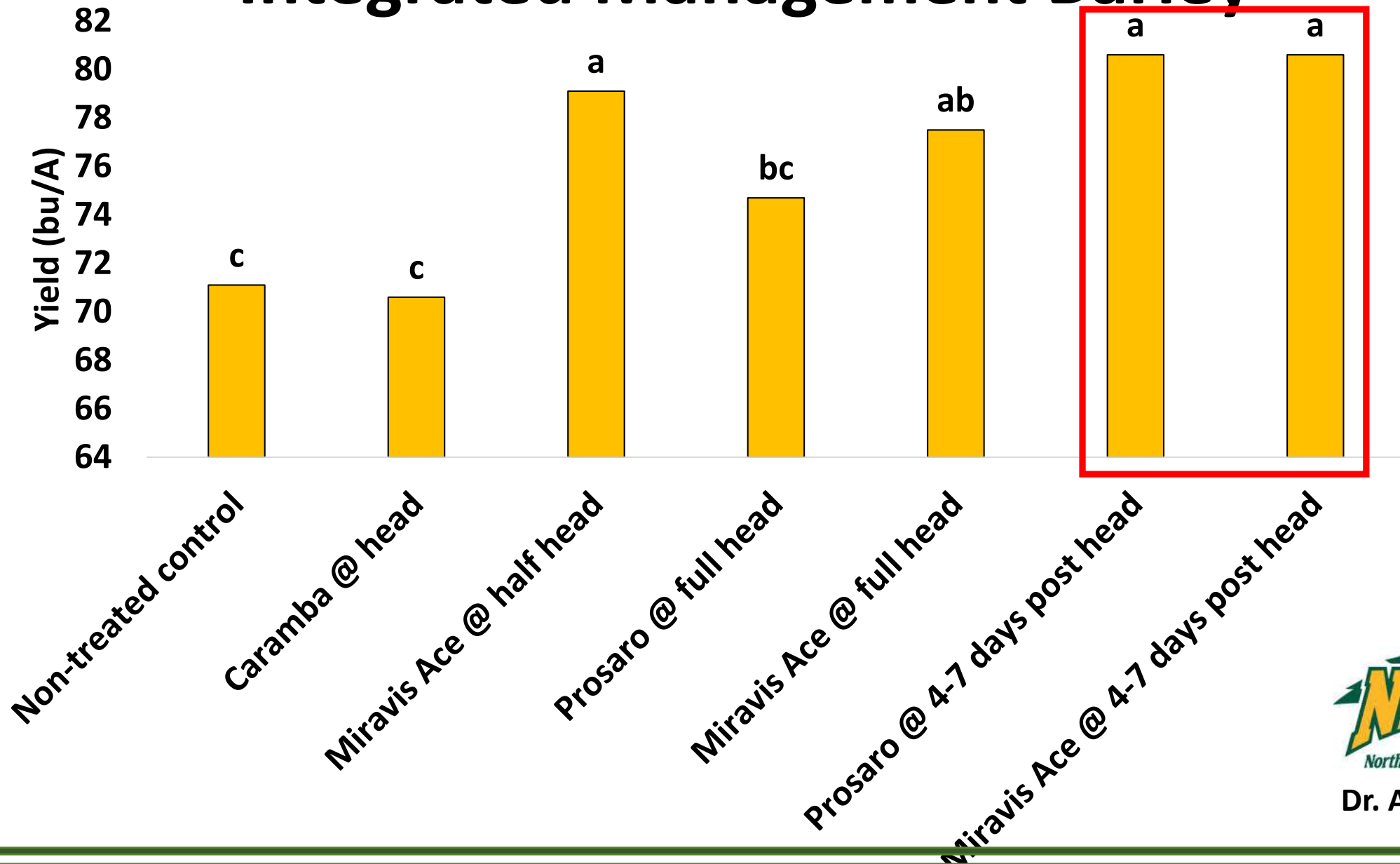
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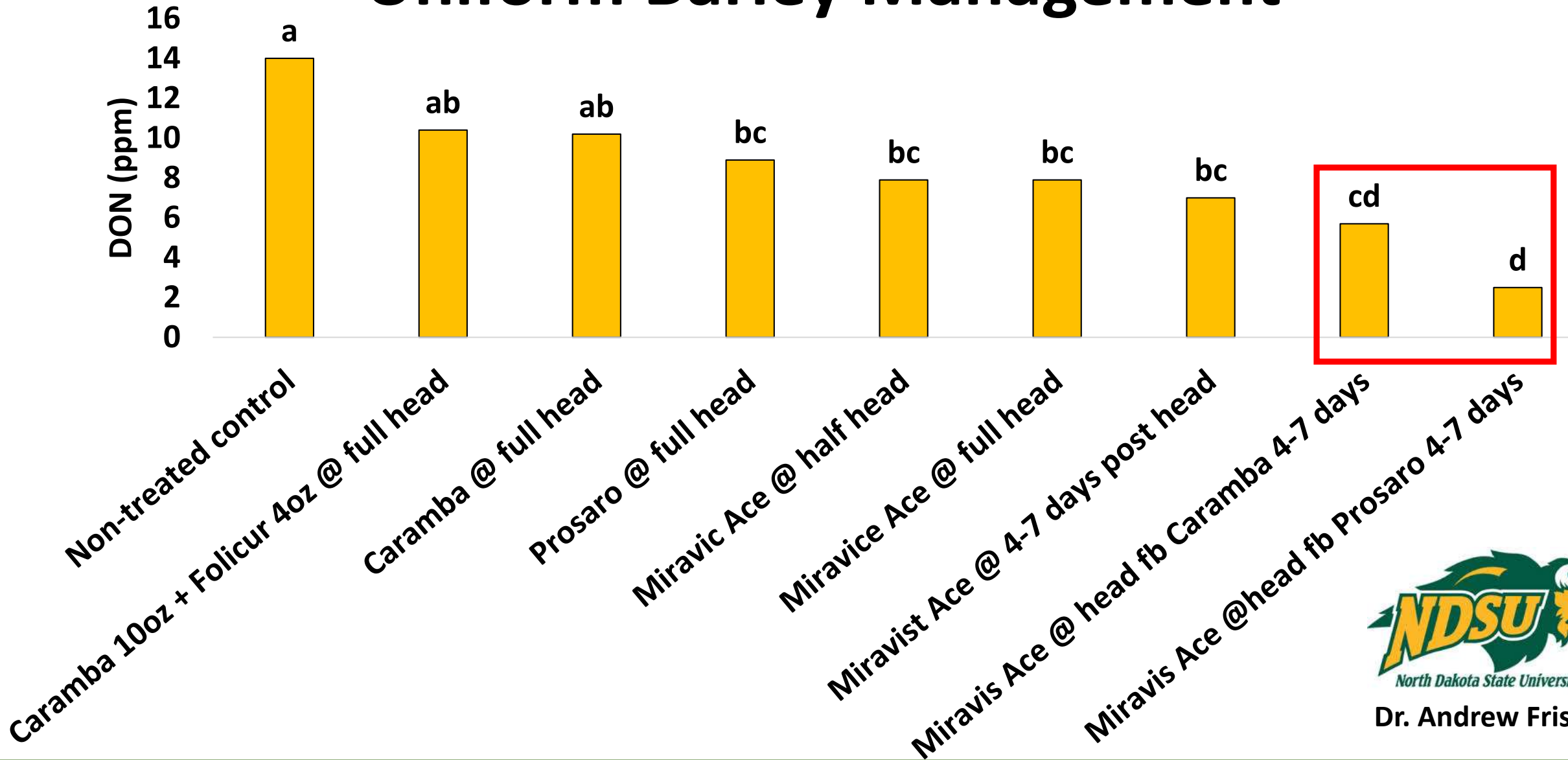
Uniform Barley Management

- Conducted in 2018 and 2019
- One location and one variety
- Data combined and analyzed PROC GLIMMIX



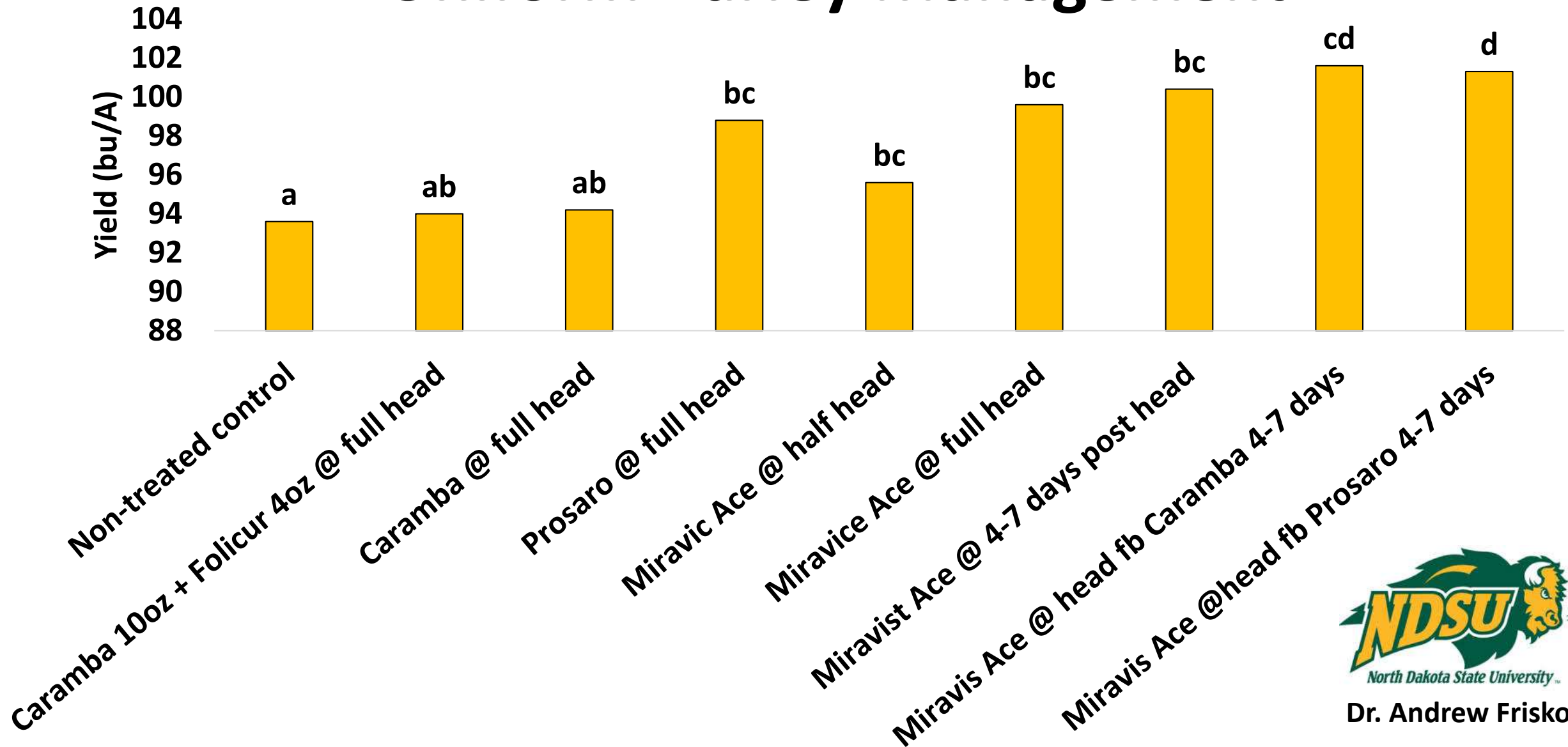
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Uniform Barley Management



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Uniform Barley Management



Dr. Andrew Friskop

Fall 2019 Planting

- East Lansing, MI
- 2-row malting barley
- 2 varieties
 - Moderately Susceptible
LCS Calypso
 - Moderately Susceptible
LCS Violetta



Planted September 25, 2019



4 weeks post emergence –
October 22, 2019



FHB Fungicide Treatment List – 2020, East Lansing

| Trt | Product | Rate | Timing |
|-----|-----------------------------|------------------------|---------------------------------|
| 1 | Non-treated Control | — | — |
| 2 | Caramba | 13.5 oz/A | Fks 10.5 (Full Head) |
| 3 | Prosaro | 6.5 oz/A | Fks 10.5 (Full Head) |
| 4 | Miravis Ace | 13.7 oz/A | Fks 10.5 (Full Head) |
| 5 | Miravis Ace | 13.7 oz/A | Fks 10.3 (Half Spike Emergence) |
| 6 | Miravis Ace fb Prosaro | 13.7 oz/A fb 6.5 oz/A | Fks 10.5 fb Fks 10.5 + 4-6 days |
| 7 | Miravis Ace fb Caramba | 13.7 oz/A fb 13.5 oz/A | Fks 10.5 fb Fks 10.5 + 4-6 days |
| 8 | Miravis Ace fb Miravis Ace | 13.7 oz/A fb 13.7 oz/A | Fks 10.5 + 4-6 days |
| 9 | Miravis Ace | 13.7 oz/A | 4-6 days post Fks 10.5 |
| 10 | Miravis Ace fb Tebuconazole | 11.5 oz/A fb 4 oz/A | Fks 10.5 fb Fks 10.5 + 4-6 days |

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Foliar Fungicide Trials

- Designing a foliar fungicide trial
 - Diseases of concern
 - Net Blotch
 - Spot Blotch
 - Scald
 - Leaf Rust
 - Powdery Mildew

- Product choices
- Feekes timings
 - Fks 5, 7, 9

What would you like to see?

