# 2021 IHARF Agronomy Update

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IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

# Presentation Overview

1. **4R Nitrogen Management in Spring Wheat** (2017-21)
2. **Winter Wheat Response to Nitrogen Rate & Management** (2019-21)
3. **Fall Rye Cover Crop Effects on Canola Emergence & Nitrogen Response** (2021)
4. **Canola Seed Safety & Yield Response to Various Phosphorus Forms** (multi-location, 2020-21)
5. **Pre-harvest Herbicide Options for Improving Seed & Straw Drydown in Flax** (2020-21)
6. **Non-traditional Nitrogen Management Strategies for Improved Flax Establishment & Yield** (multi-location, 2021)
7. **Dry Bean Response to Nitrogen Fertilization & Overall Adaption to Dryland, Solid-Seeded Production** (multi-location, 2020-2021)

# Canola Seed Safety & Yield Response to Various Phosphorus Forms (2020-21)

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FERTILIZER CANADA

Canada

# Canola Seed Safety & Yield Response to Various Phosphorus Forms (2020-21)

**Objectives:** To demonstrate canola establishment & yield response to increasing rates of seed-placed phosphorus fertilizer for various formulations

**Locations:** Indian Head, Scott, Swift Current, & Yorkton in 2020; Redvers, Outlook, & Melfort also included in 2021

**Treatments:** 4 formulations x 3 rates plus a 0P control

Formulations

1) Monoammonium Phosphate (**MAP**; 11-52-0)
2) MicroEssentials® **S15** (13-33-0-15)
3) Crystal Green® (**Struvite**; 5-28-0 + 10% Mg)
4) 50:50 MAP:Struvite (**Blend**; 8-40-0 + 5% Mg)

*** Salt Index values are MAP=27, S15=21, Struvite=8**

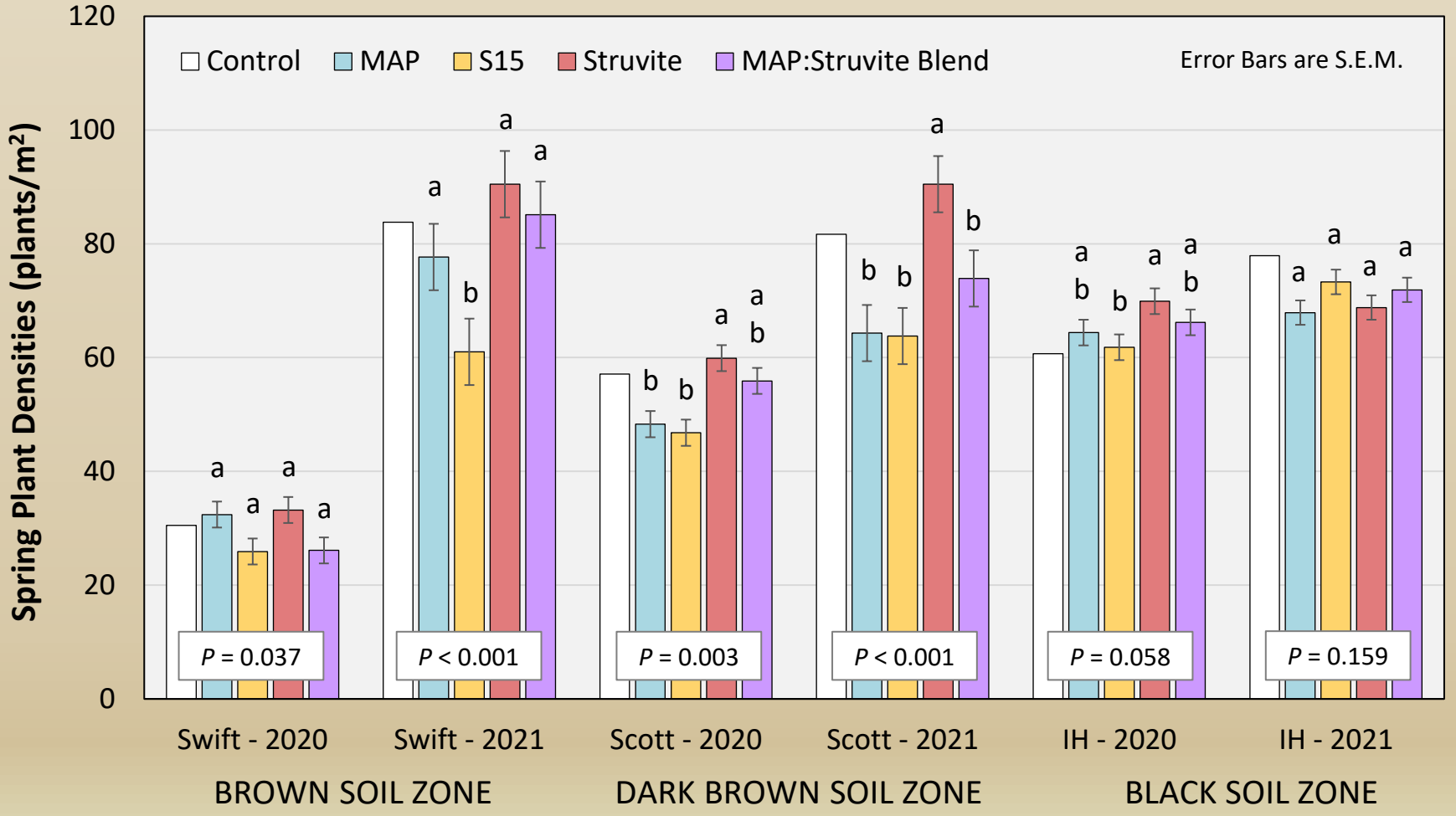
Rates

1) 22 lb $P_2O_5$/ac
2) 40 lb $P_2O_5$/ac
3) 58 lb $P_2O_5$/ac

**Data Collection:** Emergence & final densities, maturity, & yield

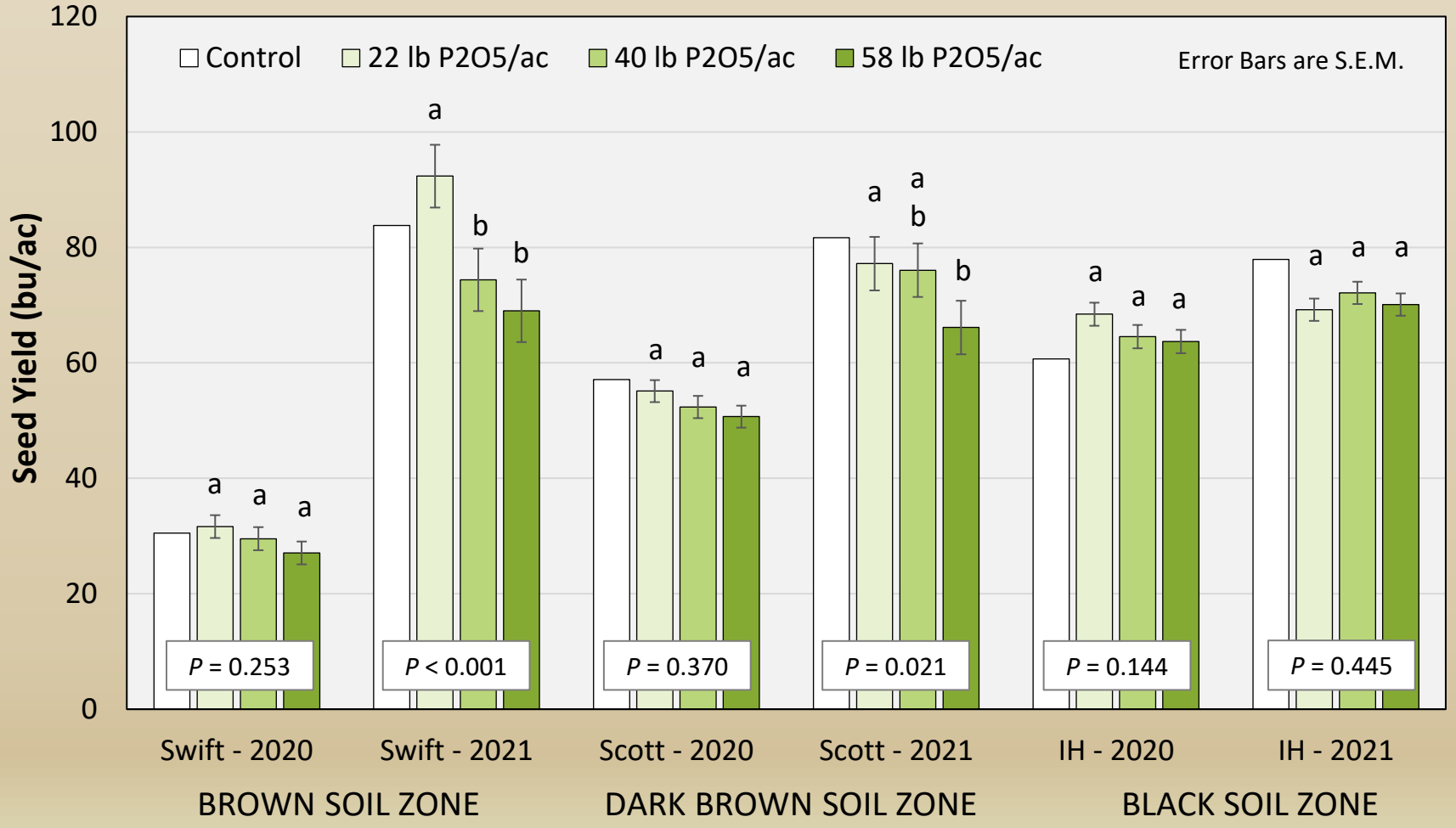
# Phosphorus Form Effects on Canola Emergence at Three Contrasting Locations (2021-2022)

## Averaged Across Rates of 22, 40, & 58 lb $P_2O_5$/ac

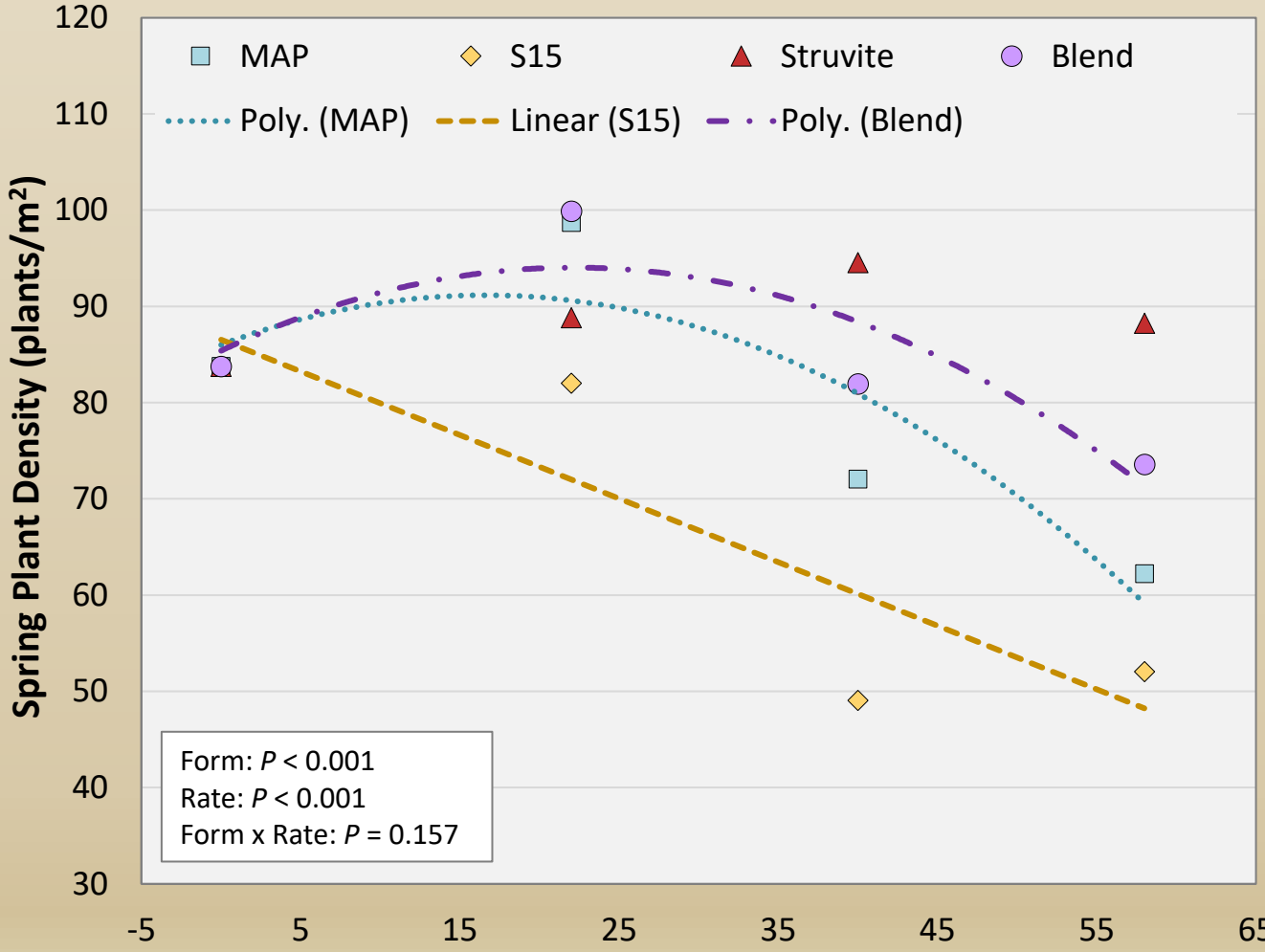


# Phosphorus Rate Effects on Canola Emergence at Three Contrasting Locations (2020-2021)

## Averaged Across Formulations

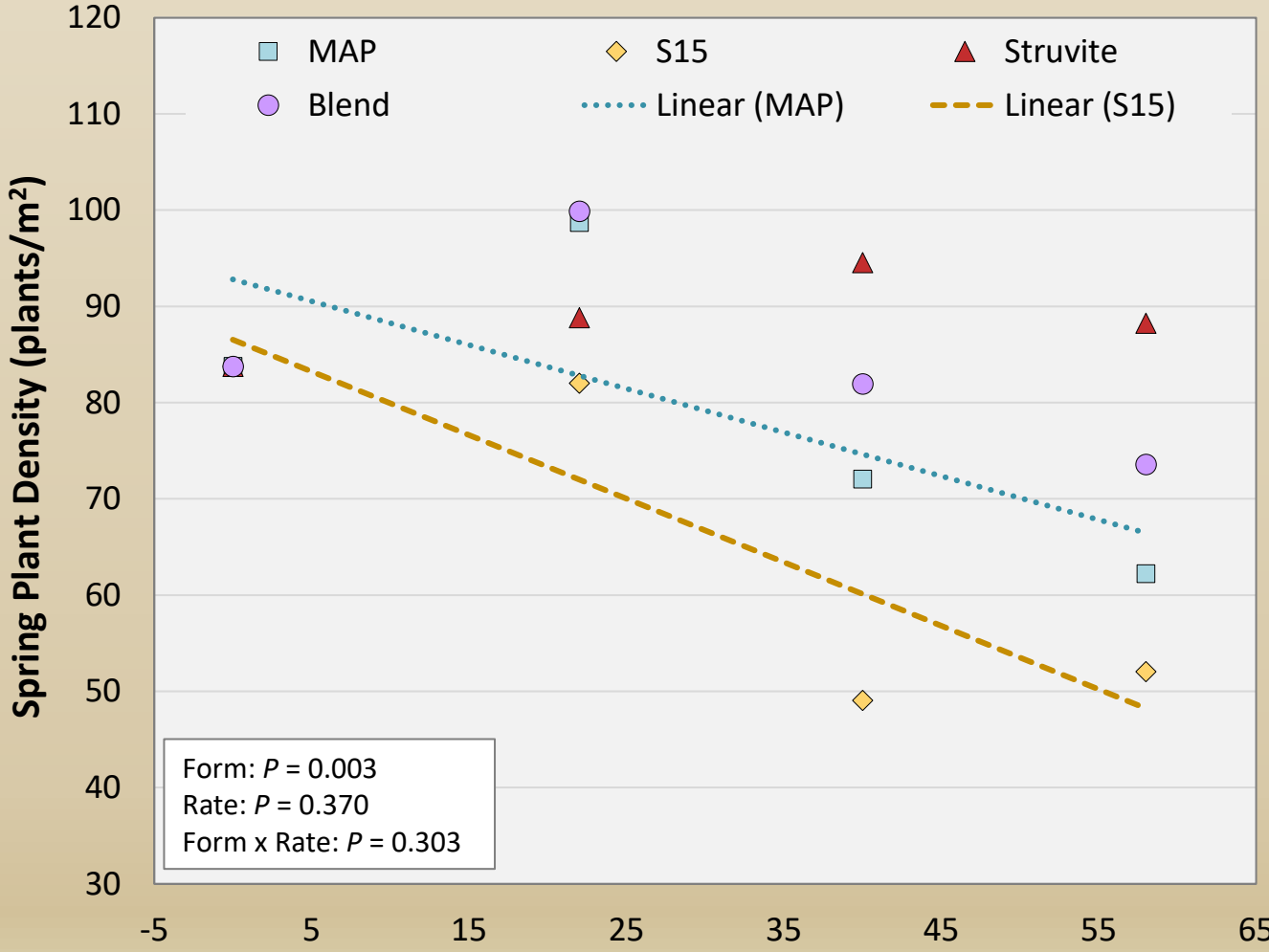


# Phosphorus Form x Rate Effects on Canola Emergence at Select Locations (Swift Current 2021)



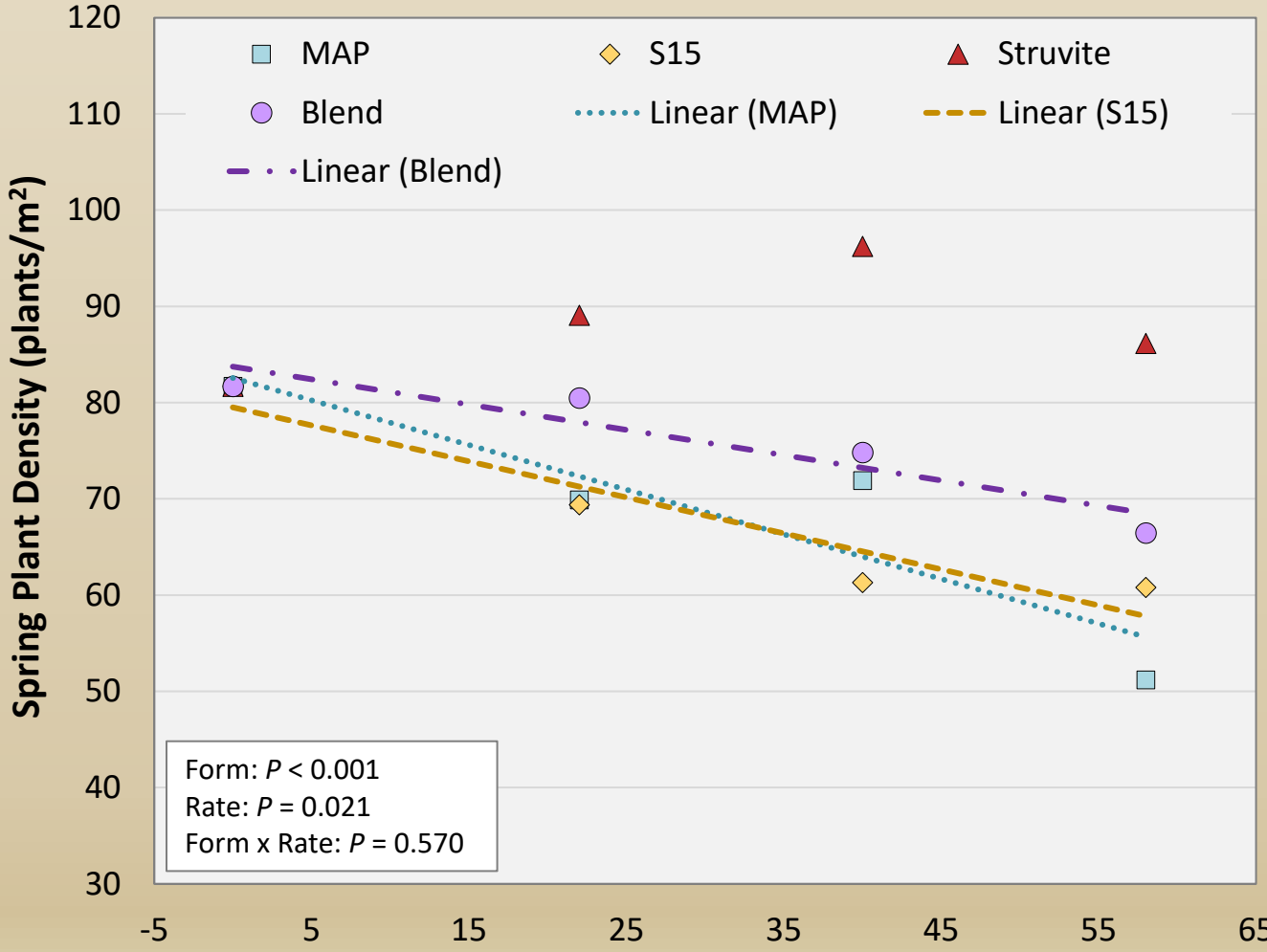

| Contrast | Pr > F |
|---|---|
| Check vs Rest | 0.513 |
| MAP – lin | **0.014** |
| MAP – quad | **0.064** |
| S15 – lin | **<0.001** |
| S15 – quad | 0.979 |
| Struv – lin | 0.553 |
| Struv – quad | 0.490 |
| Blend – lin | 0.193 |
| Blend – quad | **0.081** |

# Phosphorus Form x Rate Effects on Canola Emergence at Select Locations (Scott 2020)




| Contrast | Pr > F |
|---|---|
| Check vs Rest | 0.335 |
| MAP – lin | **0.022** |
| MAP – quad | 0.750 |
| S15 – lin | **0.011** |
| S15 – quad | 0.831 |
| Struv – lin | 0.221 |
| Struv – quad | 0.673 |
| Blend – lin | 0.459 |
| Blend – quad | 0.652 |

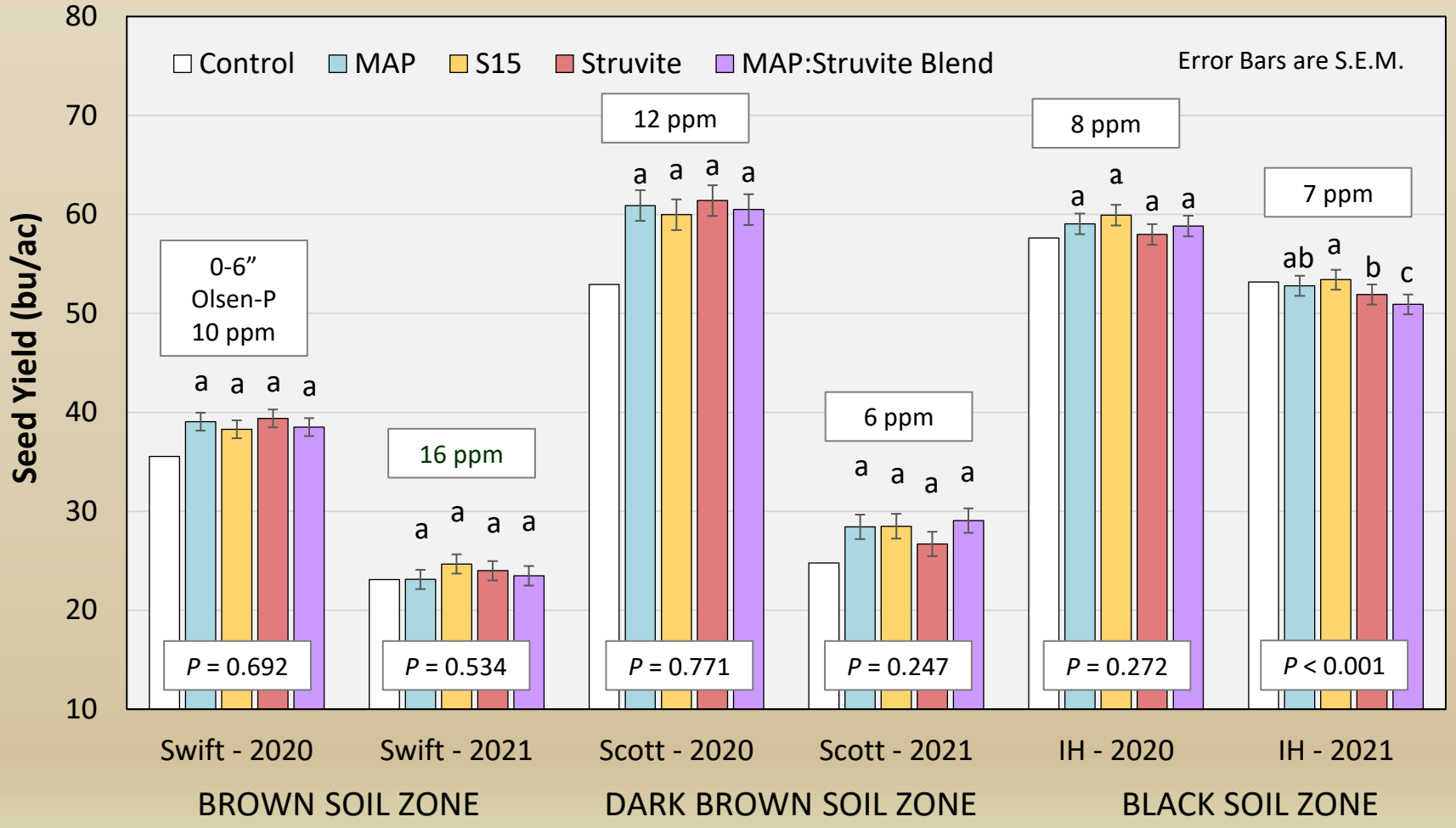
# Phosphorus Form x Rate Effects on Canola Emergence at Select Locations (Scott 2021)




| Contrast | Pr > F |
|---|---|
| Check vs Rest | 0.165 |
| MAP – lin | **0.002** |
| MAP – quad | 0.400 |
| S15 – lin | **0.009** |
| S15 – quad | 0.396 |
| Struv – lin | 0.398 |
| Struv – quad | 0.166 |
| Blend – lin | **0.060** |
| Blend – quad | 0.472 |

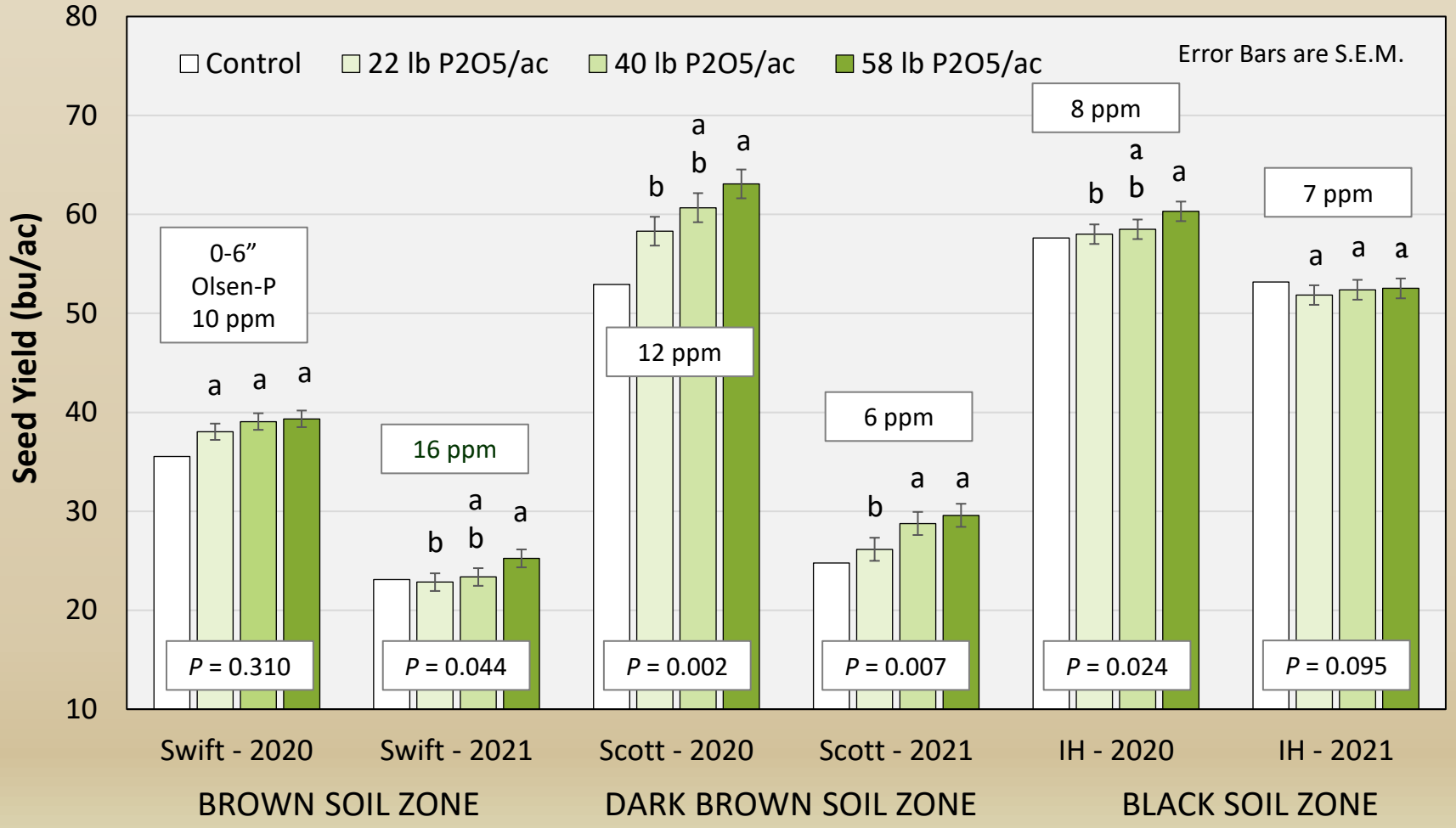
# Phosphorus Form Effects on Canola Yield at Three Contrasting Locations (2020-2021)

## Averaged Across Rates of 22, 40, & 58 lb $P_2O_5$/ac

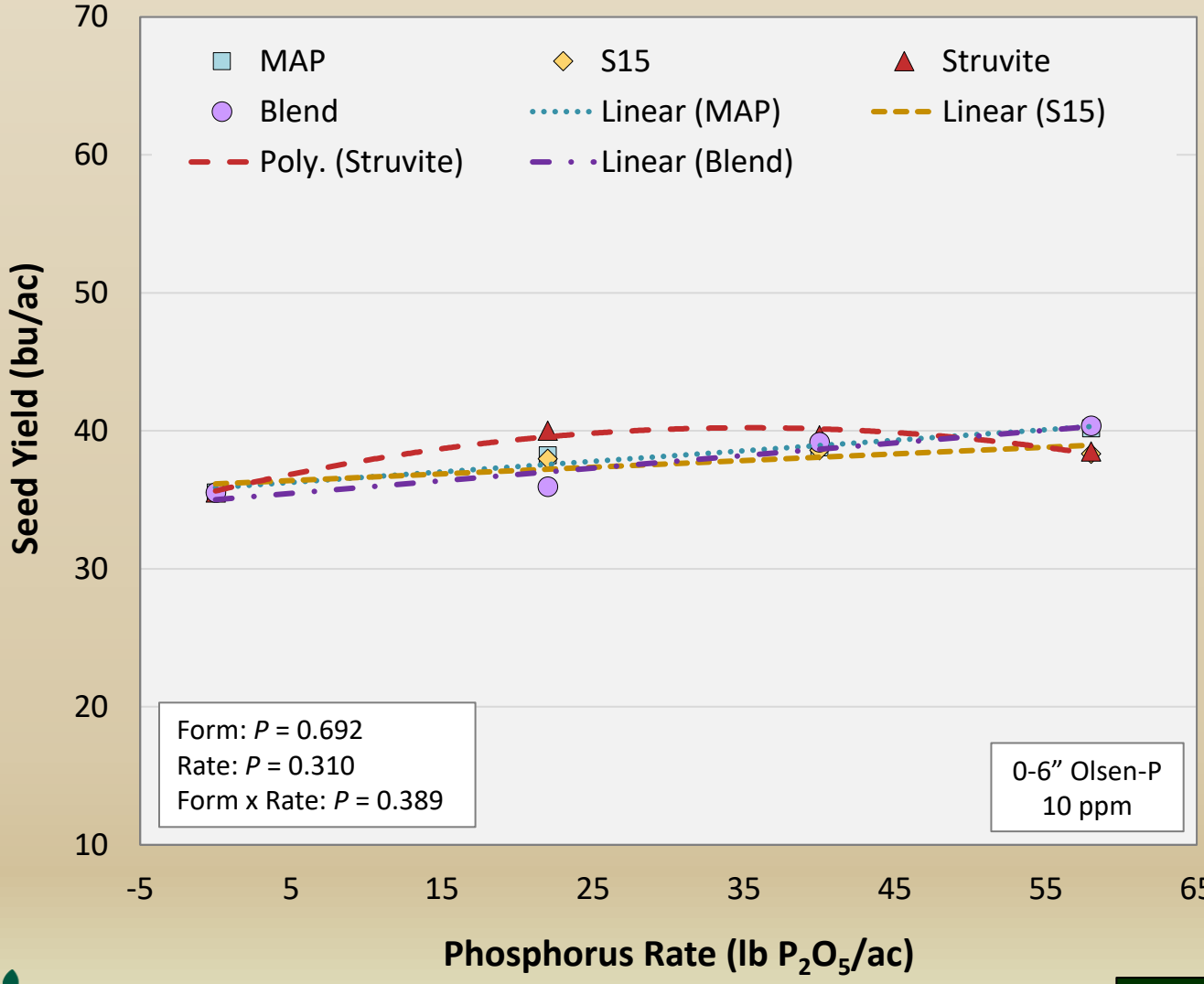


# Phosphorus Rate Effects on Canola Yield at Three Contrasting Locations (2020-2021)

## Averaged Across Formulations

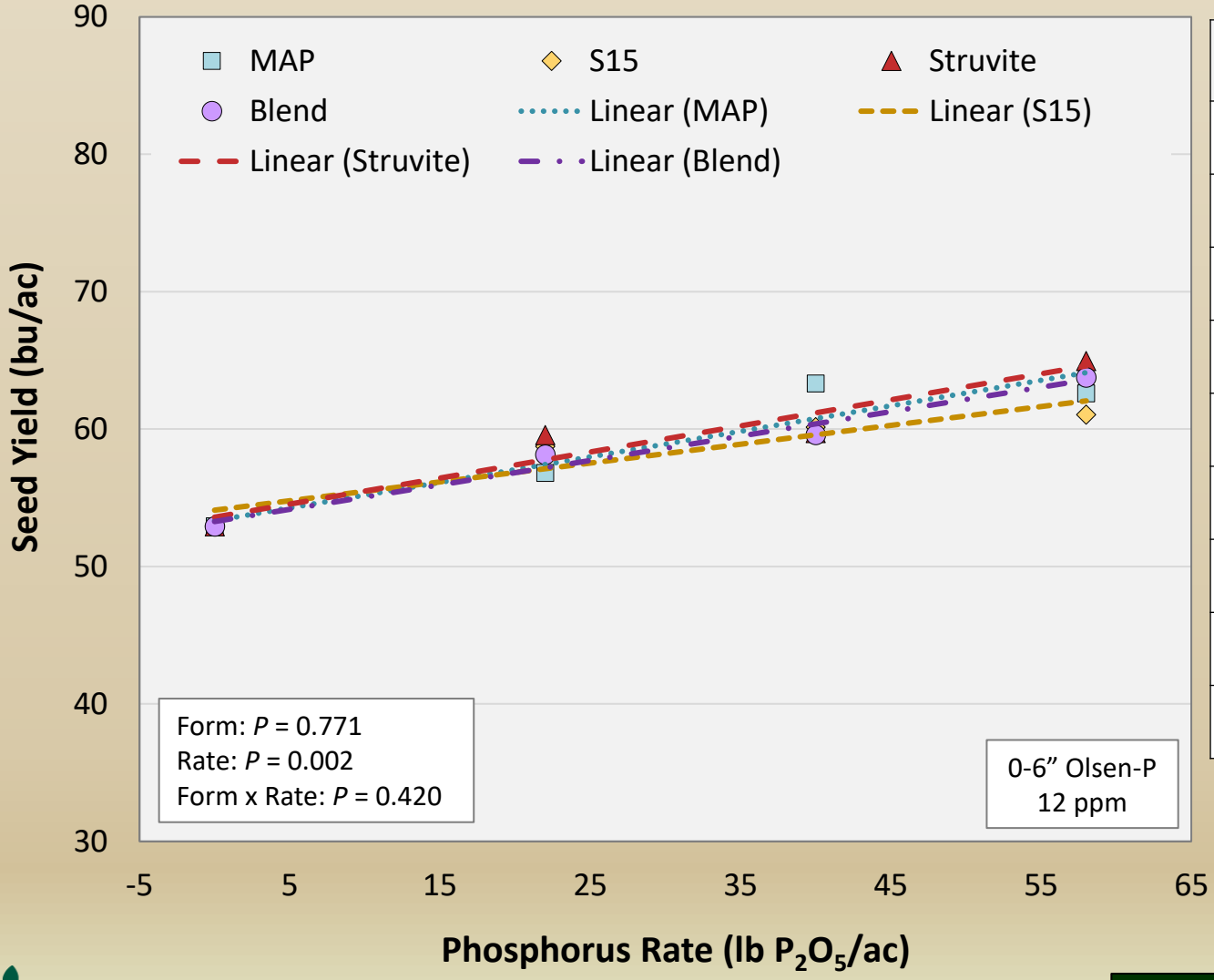


# Phosphorus Form x Rate Effects on Canola Yield at Select Locations (Swift Current 2020)



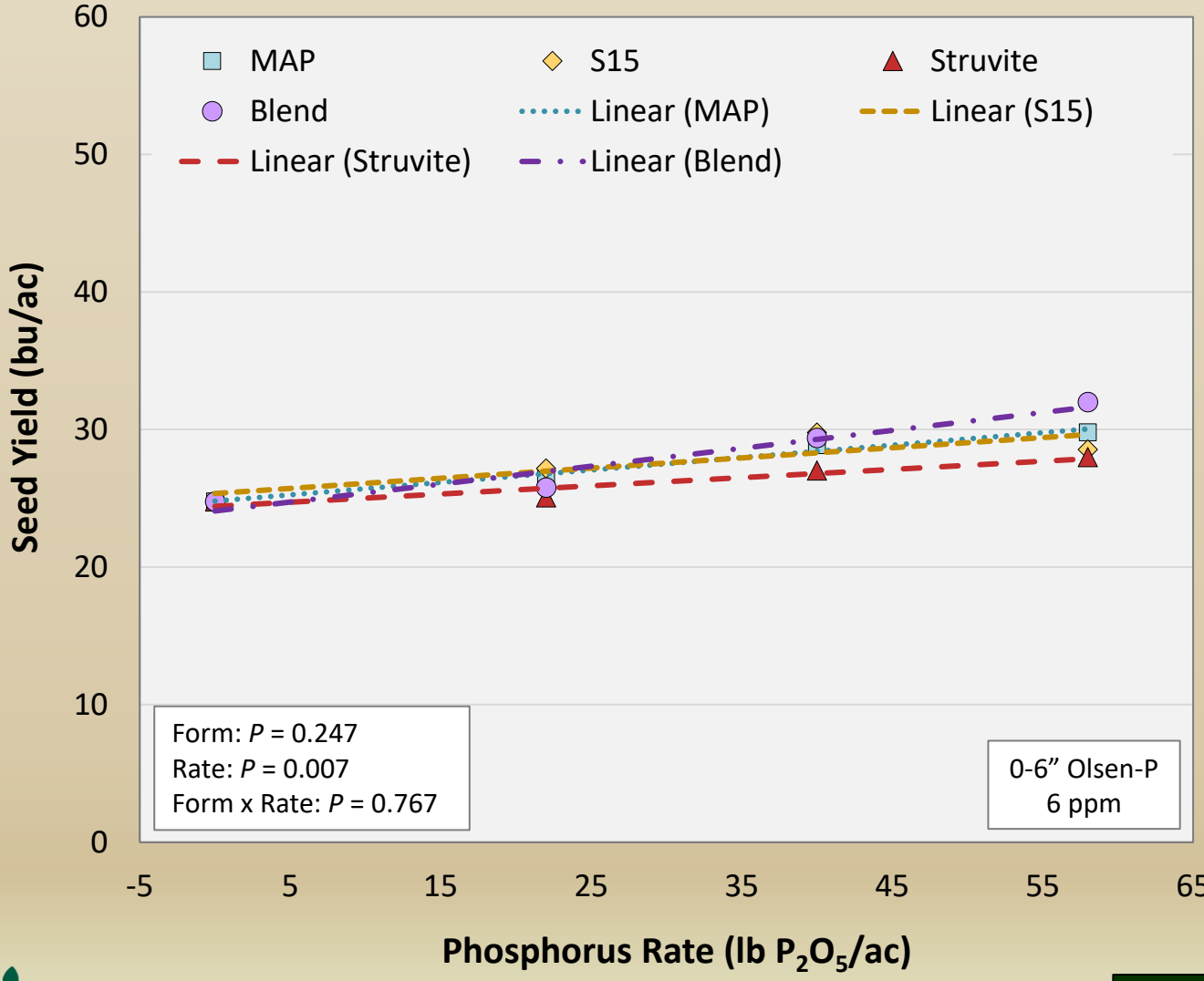

| Contrast | Pr > F |
|---|---|
| Check vs Rest | **0.015** |
| MAP – lin | **0.011** |
| MAP – quad | 0.672 |
| S15 – lin | **0.100** |
| S15 – quad | 0.316 |
| Struv – lin | **0.100** |
| Struv – quad | **0.031** |
| Blend – lin | **0.003** |
| Blend – quad | 0.591 |

# Phosphorus Form x Rate Effects on Canola Yield at Select Locations (Scott 2020)




| Contrast | Pr > F |
|---|---|
| Check vs Rest | **< 0.001** |
| MAP – lin | **<0.001** |
| MAP – quad | 0.324 |
| S15 – lin | **0.002** |
| S15 – quad | 0.209 |
| Struv – lin | **<0.001** |
| Struv – quad | 0.798 |
| Blend – lin | **<0.001** |
| Blend – quad | 0.902 |

# Phosphorus Form x Rate Effects on Canola Yield at Select Locations (Scott 2021)




| Contrast | Pr > F |
|---|---|
| Check vs Rest | **0.031** |
| MAP – lin | **0.011** |
| MAP – quad | 0.882 |
| S15 – lin | **0.035** |
| S15 – quad | 0.286 |
| Struv – lin | **0.086** |
| Struv – quad | 0.724 |
| Blend – lin | **<0.001** |
| Blend – quad | 0.431 |

# Pre-Harvest Options for Improved Stem & Seed Drydown in Flax (ADOPT-SFDC)

# Flax Pre-Harvest Herbicide/Desiccant Options

**Locations:** Indian Head, Yorkton, and Swift Current

**NOTE: Only Indian Head results presented in the interest of time**

**2020 Treatments:** 2 varieties x 4 pre-harvest treatments

| Varieties (2) | Pre-harvest Treatments (4) |
|---|---|
| 1) CDC Bethune | 1) Unsprayed Control |
| 2) CDC Glas | 2) Glyphosate (0.67 l/ac Roundup Transorb HC) |
| | 3) Saflufenacil (0.67 l/ac Roundup Transorb HC + 59 ml/ac Heat LQ[Z]) |
| | 4) Diquat (0.81 l/ac Reglone Ion) |

[Z] BASF has not fully established maximum residue limits (MRLs) for Heat LQ on flax for all markets

**2021 Treatments:** 3 varieties x 3 pre-harvest treatments

| Varieties (3) | Pre-harvest Treatments (3) |
|---|---|
| 1) CDC Bethune | 1) Unsprayed Control |
| 2) CDC Glas | 2) Glyphosate (0.67 l/ac Roundup Transorb HC) |
| 3) CDC Sorrel | 3) Diquat (0.81 l/ac Reglone Ion) |

**Data Collected:** Visual stem dry-down ratings, seed & straw moisture at harvest, & yield

# Pre-Harvest Options for Flax
## Stem Dry-Down Rating Scale (SFDC)

**1** – Almost all stems grass green

**2** – 50% mixture of grass green & green stems

**3** – Mostly green stems

**4** – 50% mixture of green & pale green stems

**5** – Mostly pale green stems

**6** – 50% mixture of pale green & yellow stems

**7** – Mostly yellow stems

**8** – 50% mixture of yellow & brown stems or mostly light brown stems

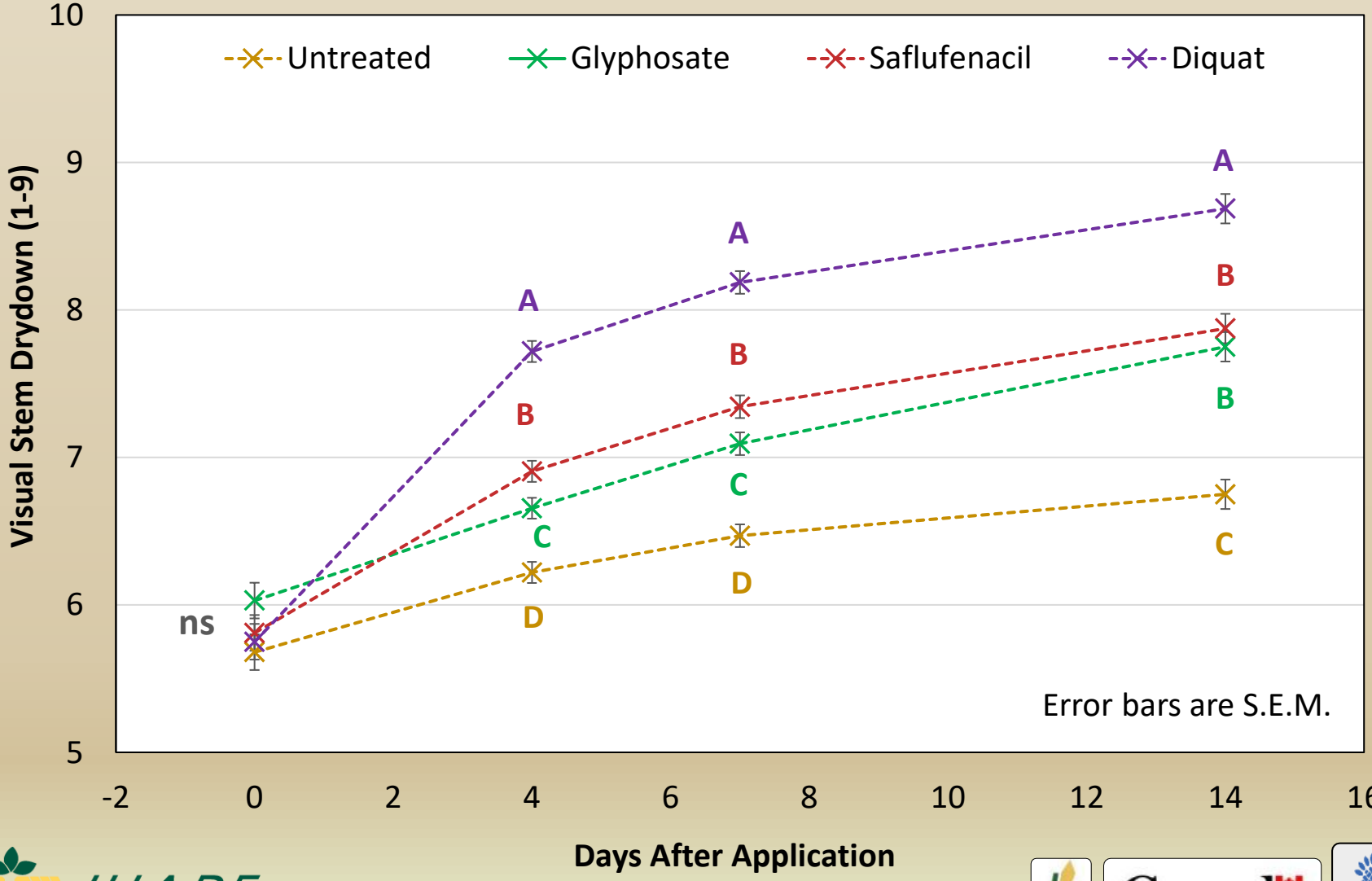
**9** – Almost all stems medium or dark brown (very dry)


0 DAA (Aug-21) | 4 DAA (Aug-25) | 7 DAA (Aug-28) | 14 DAA (Sep-4)

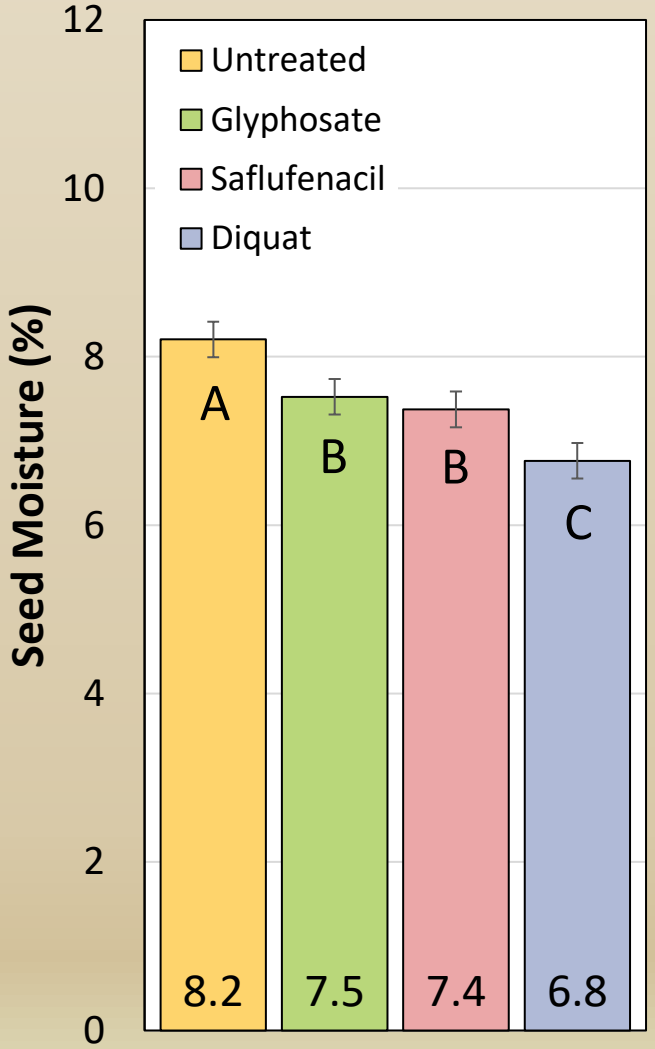
CDC Glas - Untreated

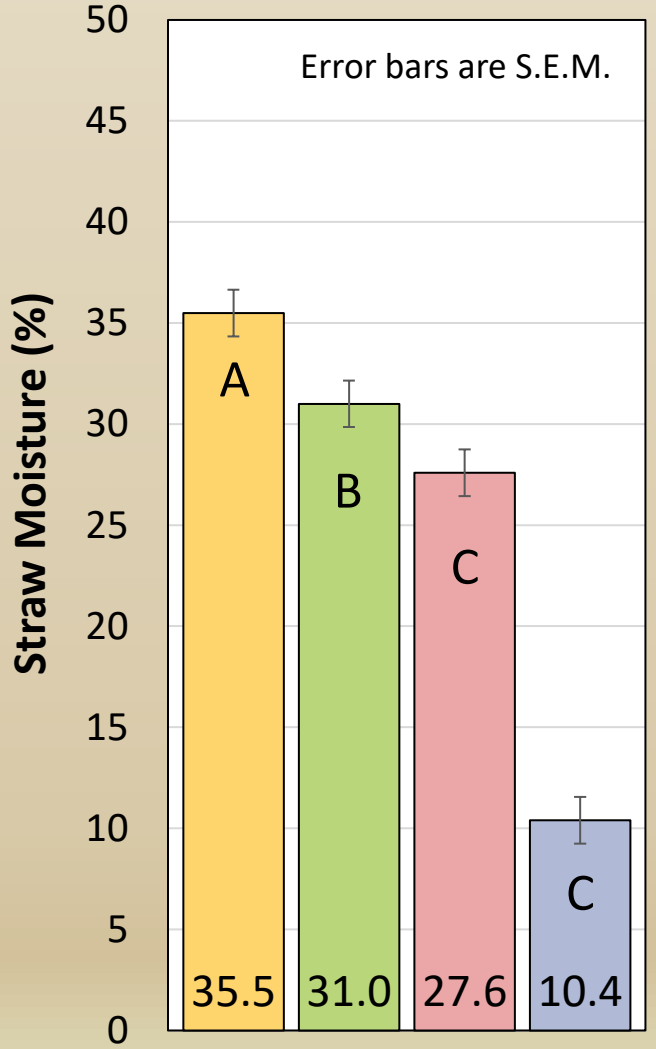
CDC Glas - Diquat

# Pre-Harvest Treatment Effects on Flax Visual Stem Drydown at Indian Head 2020



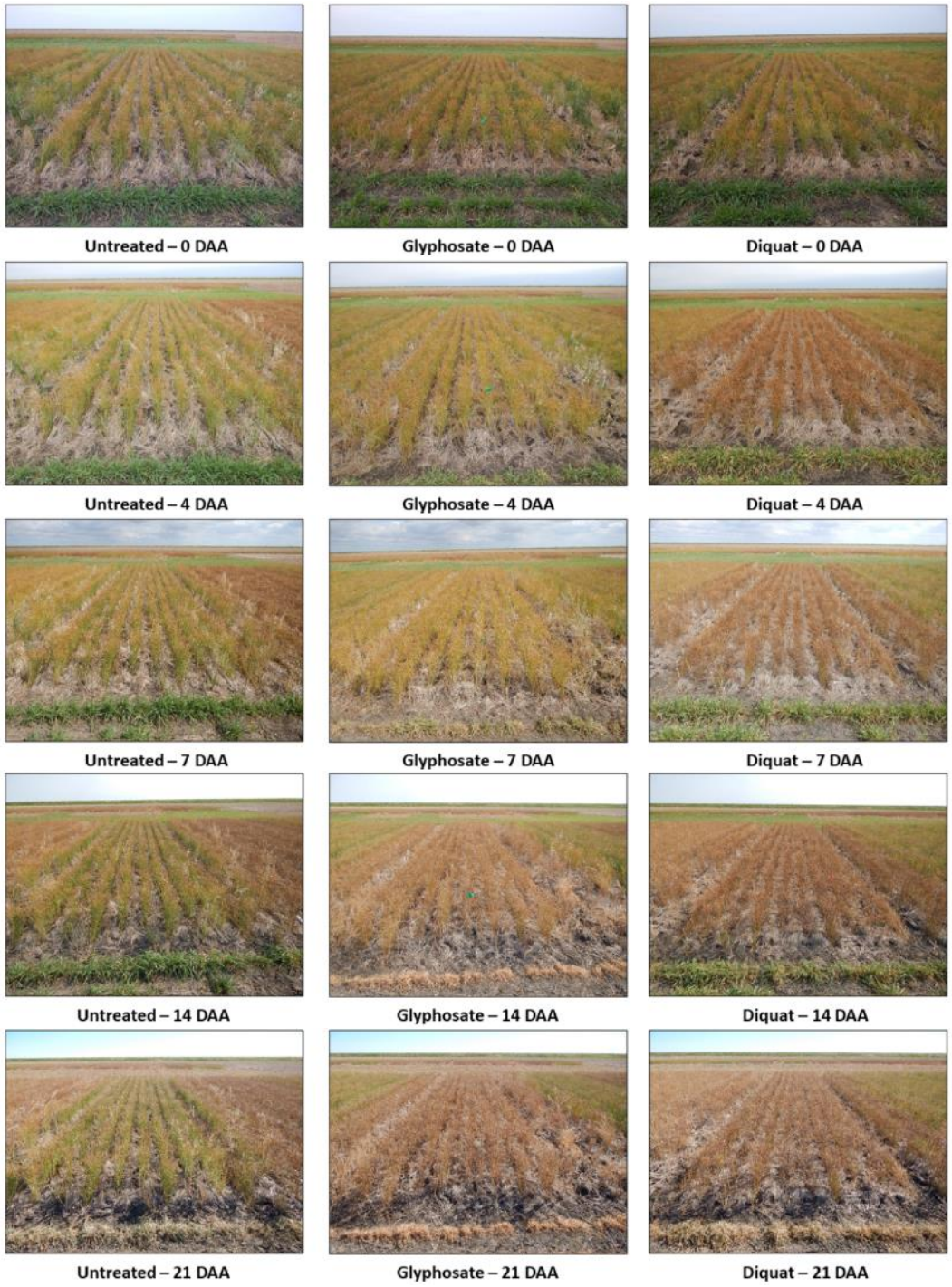
# Pre-Harvest Treatment Effects on Flax Seed & Straw Moisture (Indian Head 2020)




| Seed Moisture | |
|---|---|
| **Source** | **Pr > F** |
| VAR | 0.713 |
| TRT | <0.001 |
| VAR x TRT | 0.836 |

| Straw Moisture | |
|---|---|
| **Source** | **Pr > F** |
| VAR | 0.001 |
| TRT | <0.001 |
| VAR x TRT | 0.514 |




**0 DAA (Aug-27, 2021)**

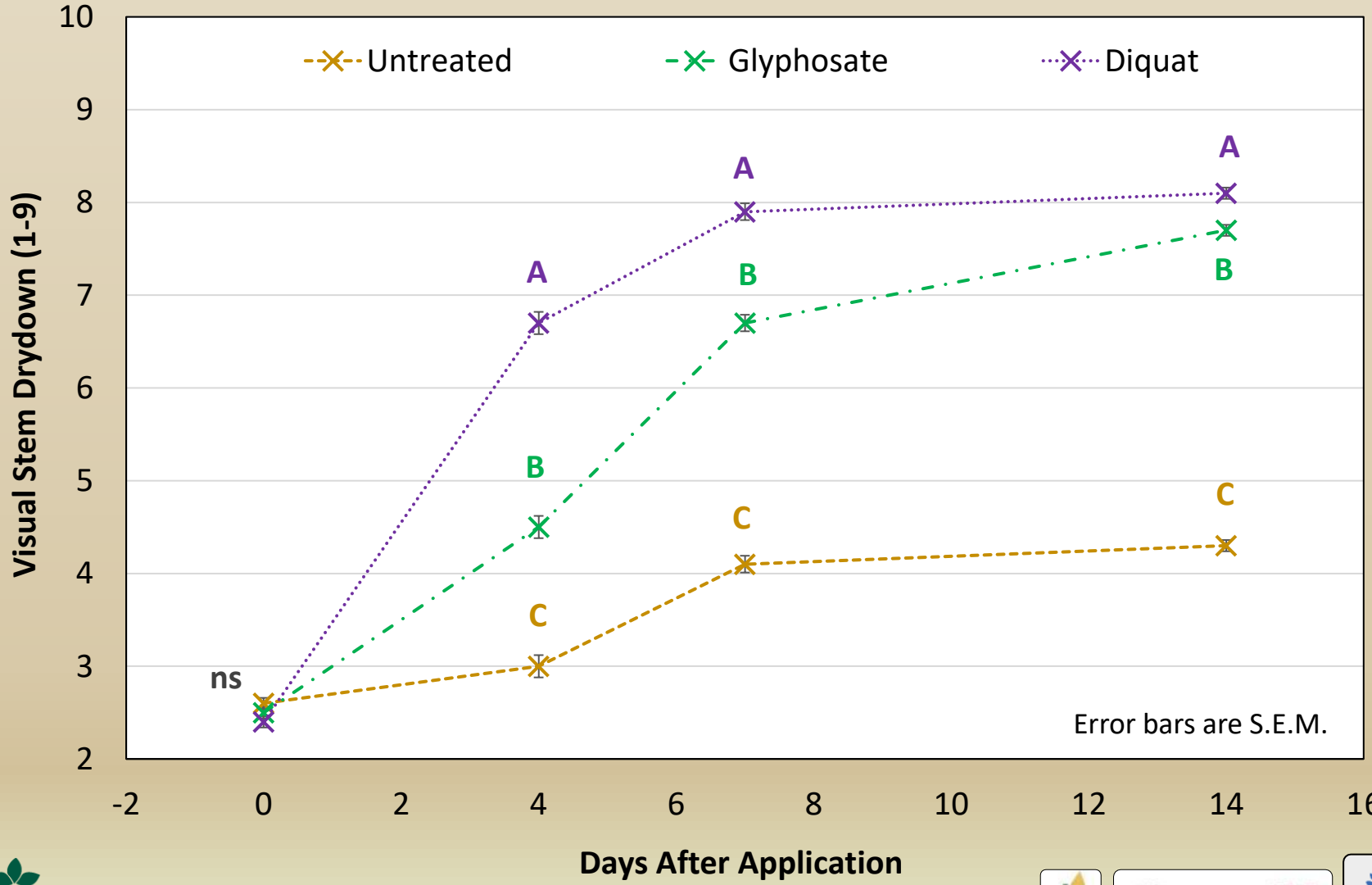
**4 DAA (Aug-31)**

**7 DAA (Sep-3)**

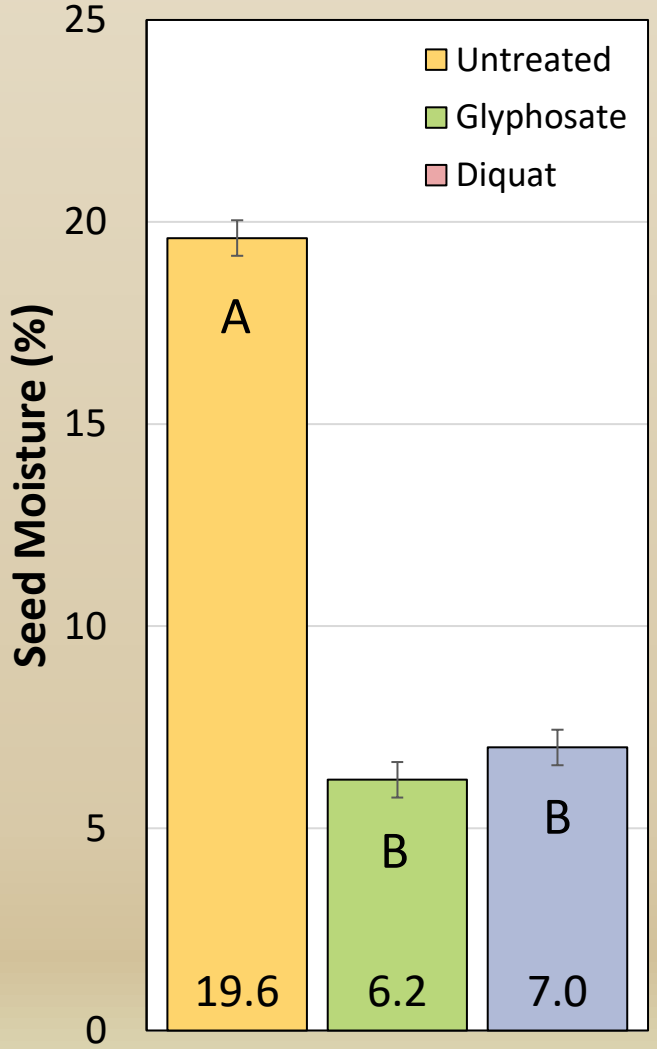
**14 DAA (Sep-10)**

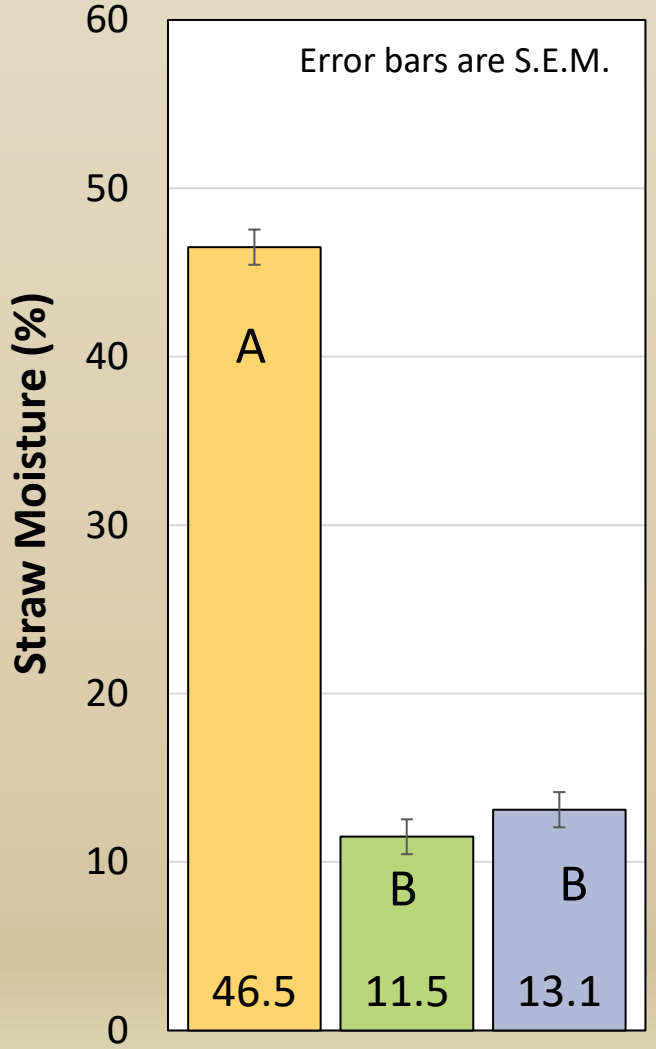
**21 DAA (Sep-17)**
**Harvest Date**

# Pre-Harvest Treatment Effects on Flax Visual Stem Drydown at Indian Head 2021



# Pre-Harvest Treatment Effects on Flax Seed & Straw Moisture (Indian Head 2021)

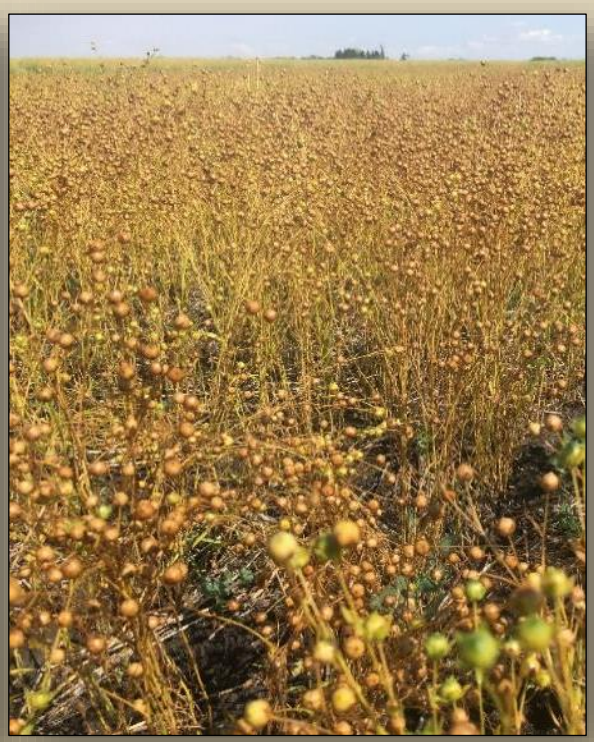



| Seed Moisture | |
|---|---|
| **Source** | **Pr > F** |
| VAR | 0.050 |
| TRT | <0.001 |
| VAR x TRT | 0.003 |

| Straw Moisture | |
|---|---|
| **Source** | **Pr > F** |
| VAR | 0.071 |
| TRT | <0.001 |
| VAR x TRT | 0.135 |

# Non-Traditional Nitrogen Fertilizer Management Options for Improving Establishment & Yield in Flax (2021)



# Flax Non-Traditional Nitrogen Fertilizer Management Trial Information

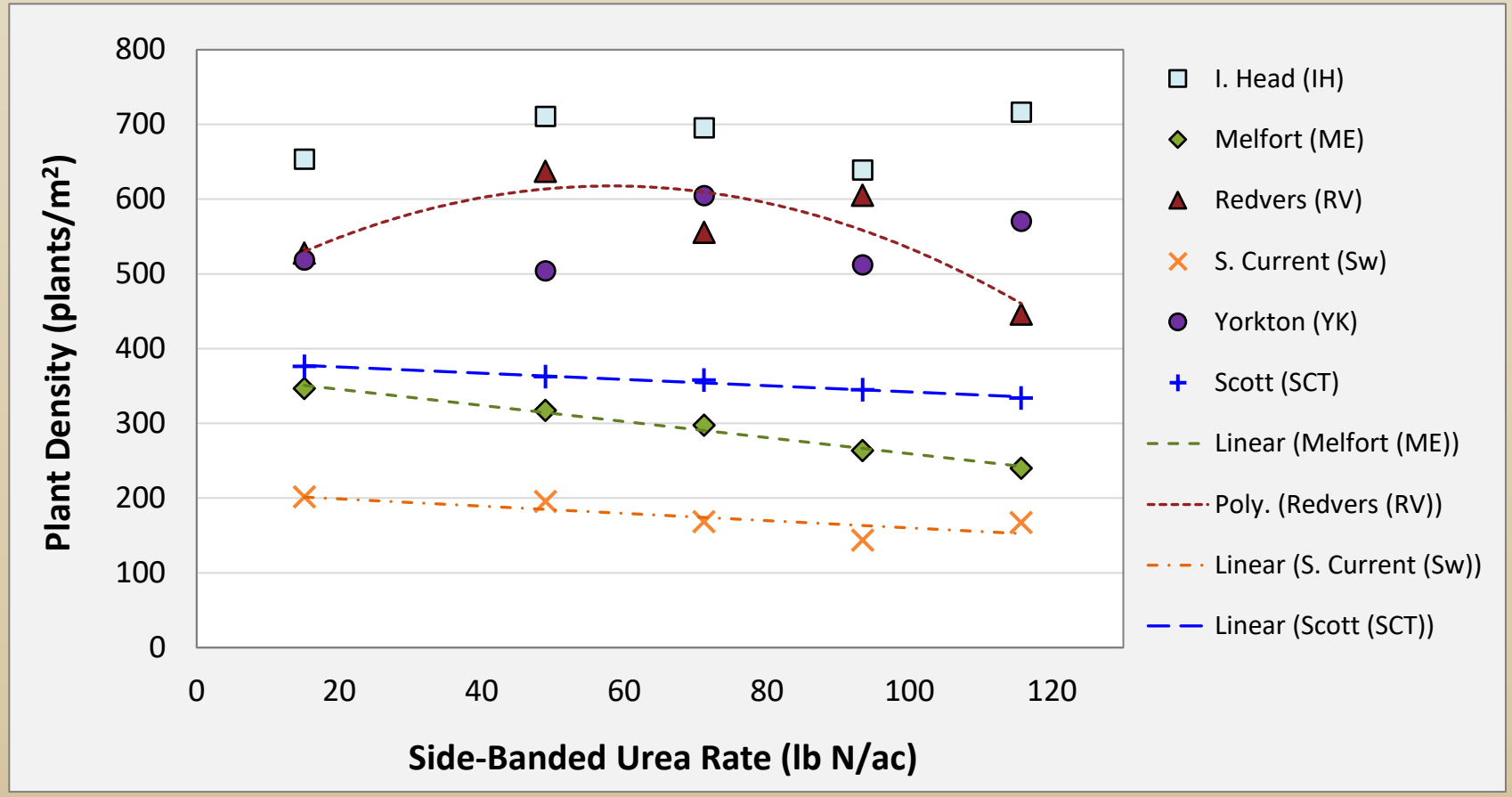
**Locations:** Indian Head, Melfort, Redvers, Swift Current, Yorkton, & Scott

**Treatments:**

| # | Name | lb N-$P_2O_5$-$K_2O$-S/ac | Comments |
|---|---|---|---|
| 1 | Check | 15-36-0-10 | - N from 69 lb/ac MAP and 37 lb/ac AS |
| 2 | Low N – urea | 49-36-0-10 | - all N side-banded as either untreated urea or a blend of 75% ESN:25% untreated urea |
| 3 | Medium N – urea | 71-36-0-10 | |
| 4 | High N – urea | 93-36-0-10 | |
| 5 | High N – 75% ESN | 93-36-0-10 | |
| 6 | Ultra N – urea | 116-36-0-10 | |
| 7 | Ultra N – 75% ESN | 116-36-0-10 | |
| 8 | Split – early in-crop urea | 93-36-0-10 | - 49 lb N/ha side-banded and 45 lb N/ac broadcast as untreated urea or NBPT when the flax is 2-4" tall |
| 9 | Split – early in-crop NBPT | 93-36-0-10 | |
| 10 | Split – late in-crop urea | 93-36-0-10 | - 49 lb N/ha side-banded and 45 lb N/ac broadcast as untreated urea or NBPT when the flax is budding-1st flower |
| 11 | Split – late in-crop NBPT | 93-36-0-10 | |

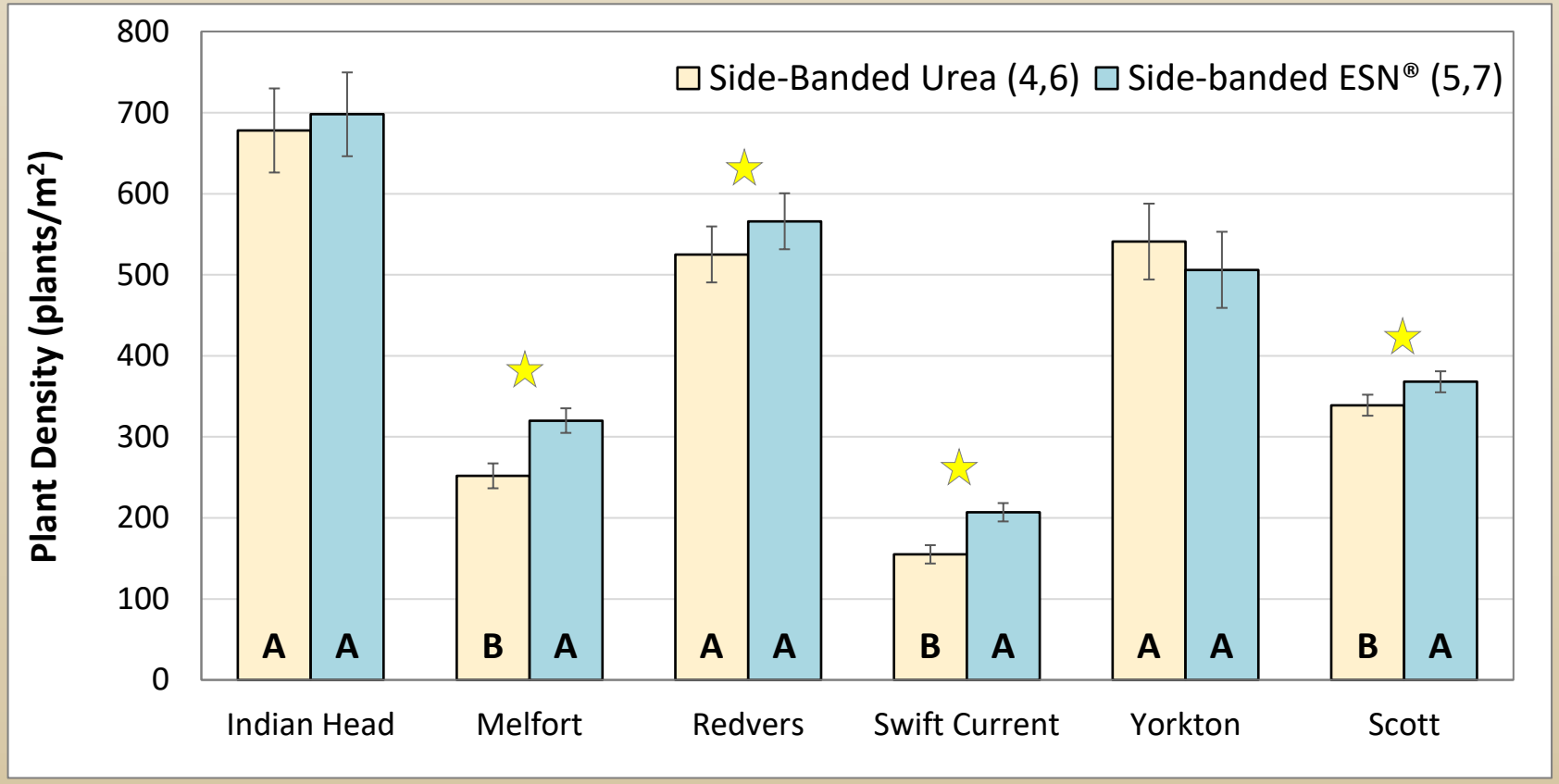
**Data Collection:** Plant Density & Seed Yield

# Effects of Increasing Rates of Side-Banded Urea on Flax Emergence in 2021



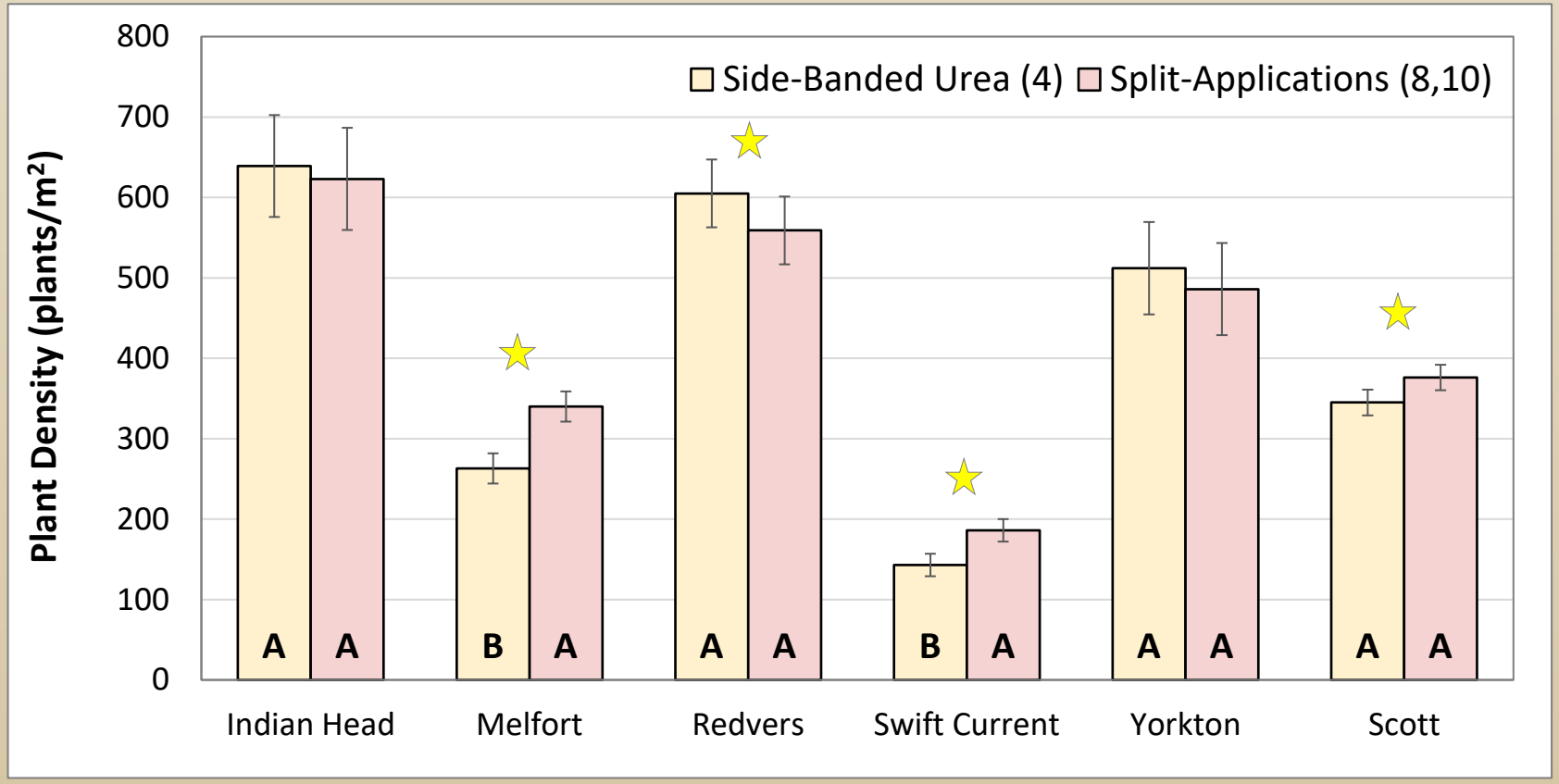

Reduced emergence with increasing rated of side-banded, untreated urea at 4/6 locations, consistent with recent Prairie-wide research where 75% of sites had this response

# Improved Flax Establishment with Polymer Coated Urea Side-Banded at High Rates



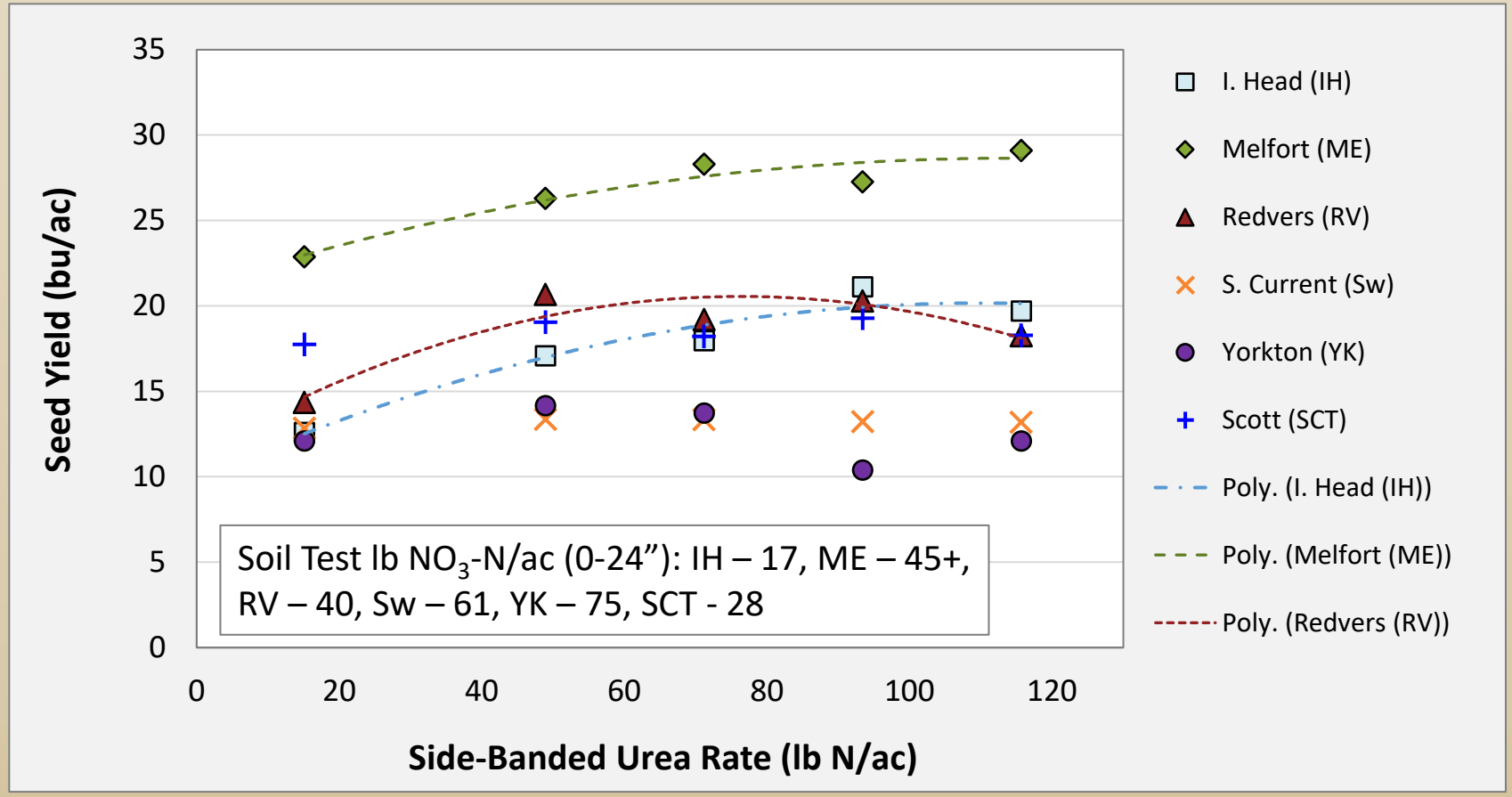

Substituting urea for 75% ESN improved establishment for all sites where emergence was negatively affected by high rates of side-banded urea, except Redvers where there was still a trend for better establishment with the ESN® blend

# Improved Flax Establishment with Polymer Coated Urea Side-Banded at High Rates



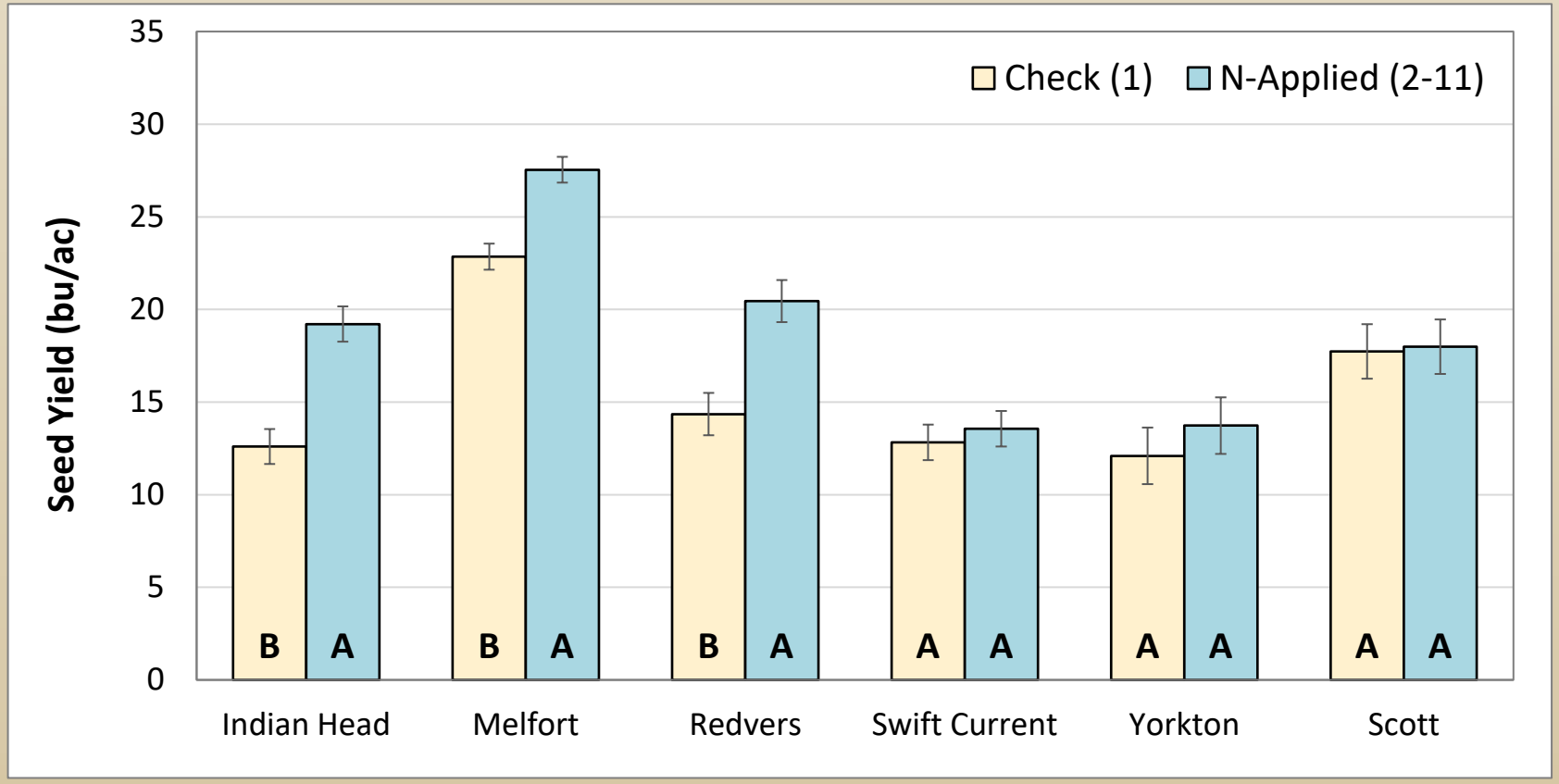

The benefit to split-applications for improving plant populations was slightly less pronounced than the ESN® blend, mainly due to these treatments not being tested at the ultra-high application rate. Still a significant benefit at Melfort & Swift Current.

# Effects of Increasing Rates of Side-Banded Urea on Flax Yield in 2021




Lack of yield response at Swift Current & Yorkton can be explained by low yields & high residual N but was not expected at Scott. Soil was only sampled to 12” at Melfort.

# Overall Flax Yield Response to Nitrogen Fertilization at Six Locations in 2021




Yield comparisons of side-banded urea vs. ESN®, side-banding vs. split-applications, early vs. late in-crop applications, or in-crop urea vs. NBPT treated urea produced little for meaningful differences under the conditions encountered.

# Dry Bean Response to Nitrogen Rate & Overall Adaptation to Dryland Solid-Seeded Production in SK (2020-21)

# Dry Bean Response to Nitrogen & Overall Adaptation (2020-21)

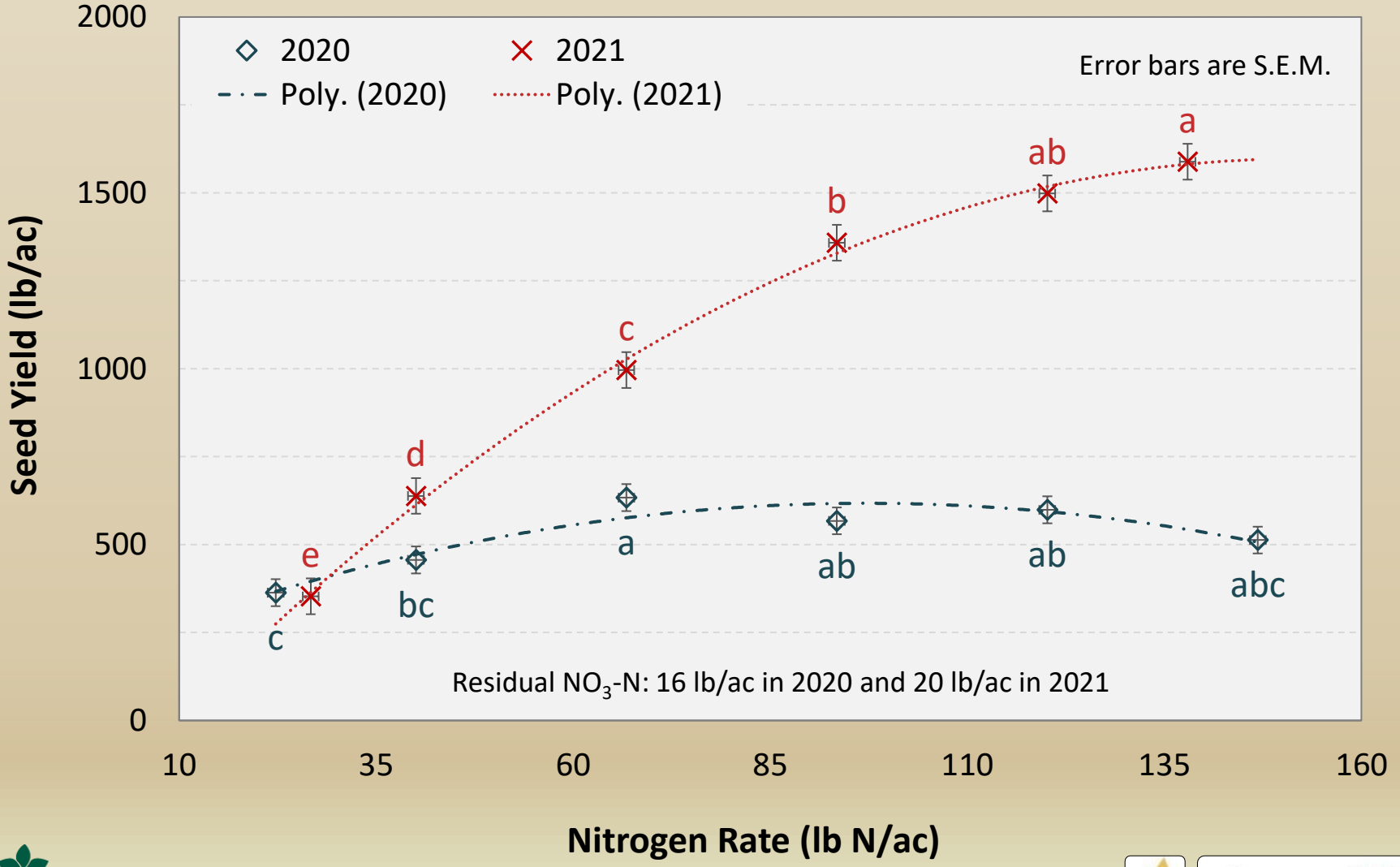
**Objectives:** To demonstrate the response of dryland, solid-seeded black beans to varying rates of N fertilizer across a range of Saskatchewan environments

**Locations:** Indian Head, Redvers, Melfort, & Yorkton

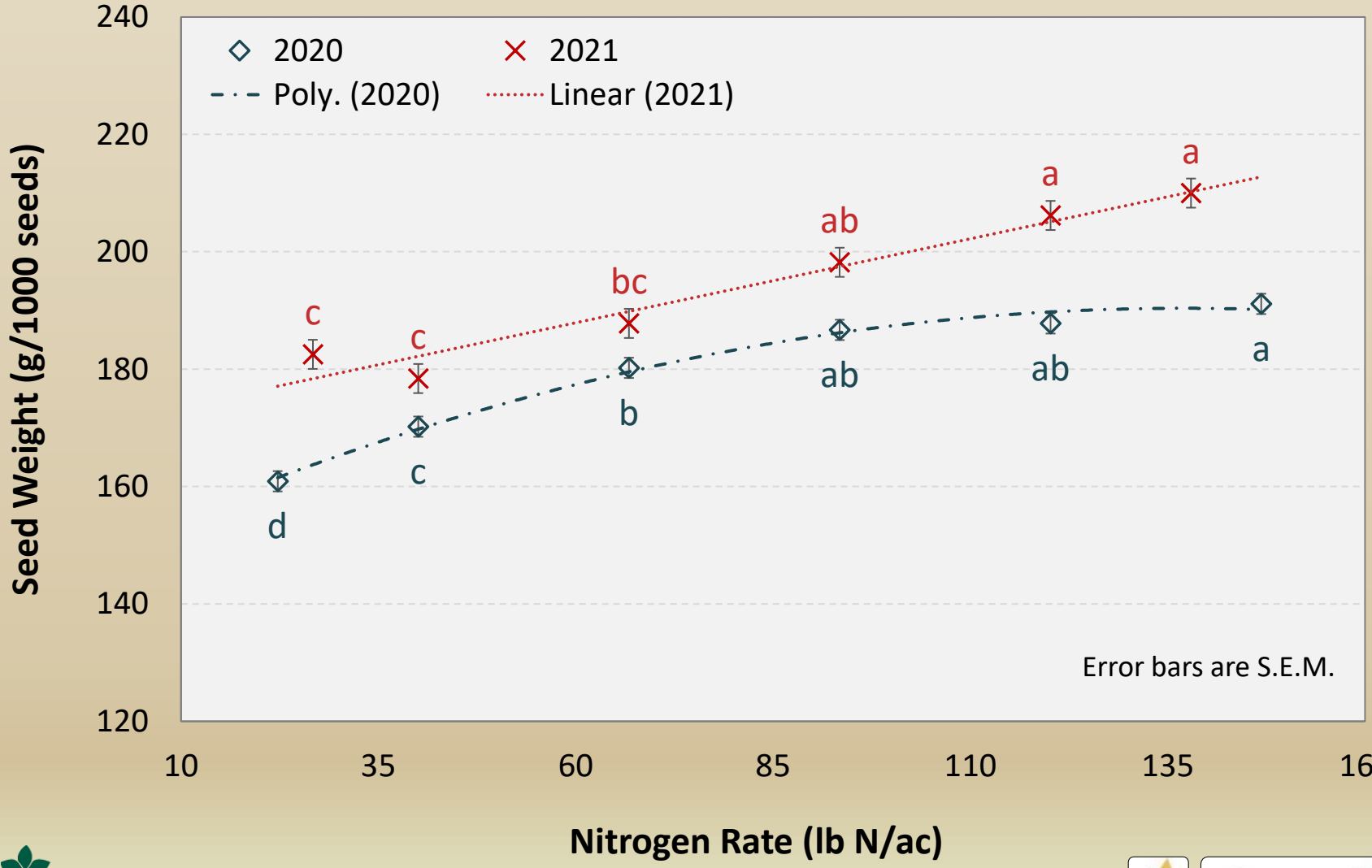
**Treatments:** Six rates of side-banded urea to target a total of 40, 67, 93, 120, and 138-147 lb N/ac plus a control where no supplemental N was provided

**Data Collection:** Emergence, height, maturity, disease, yield, & TKW

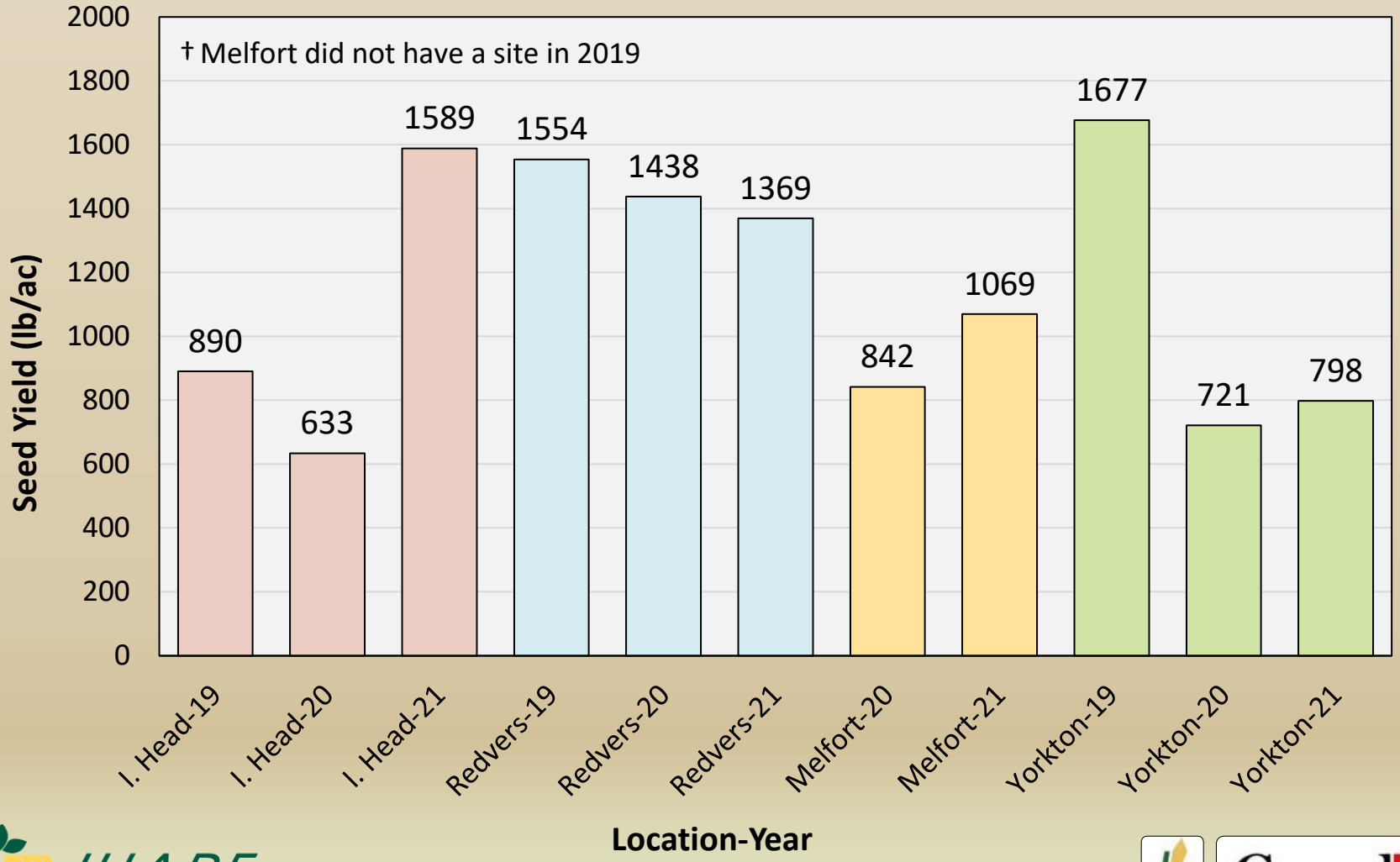
# Nitrogen Fertilizer Rate Effects on Dry Bean Yields at Indian Head (2020 vs. 2021)



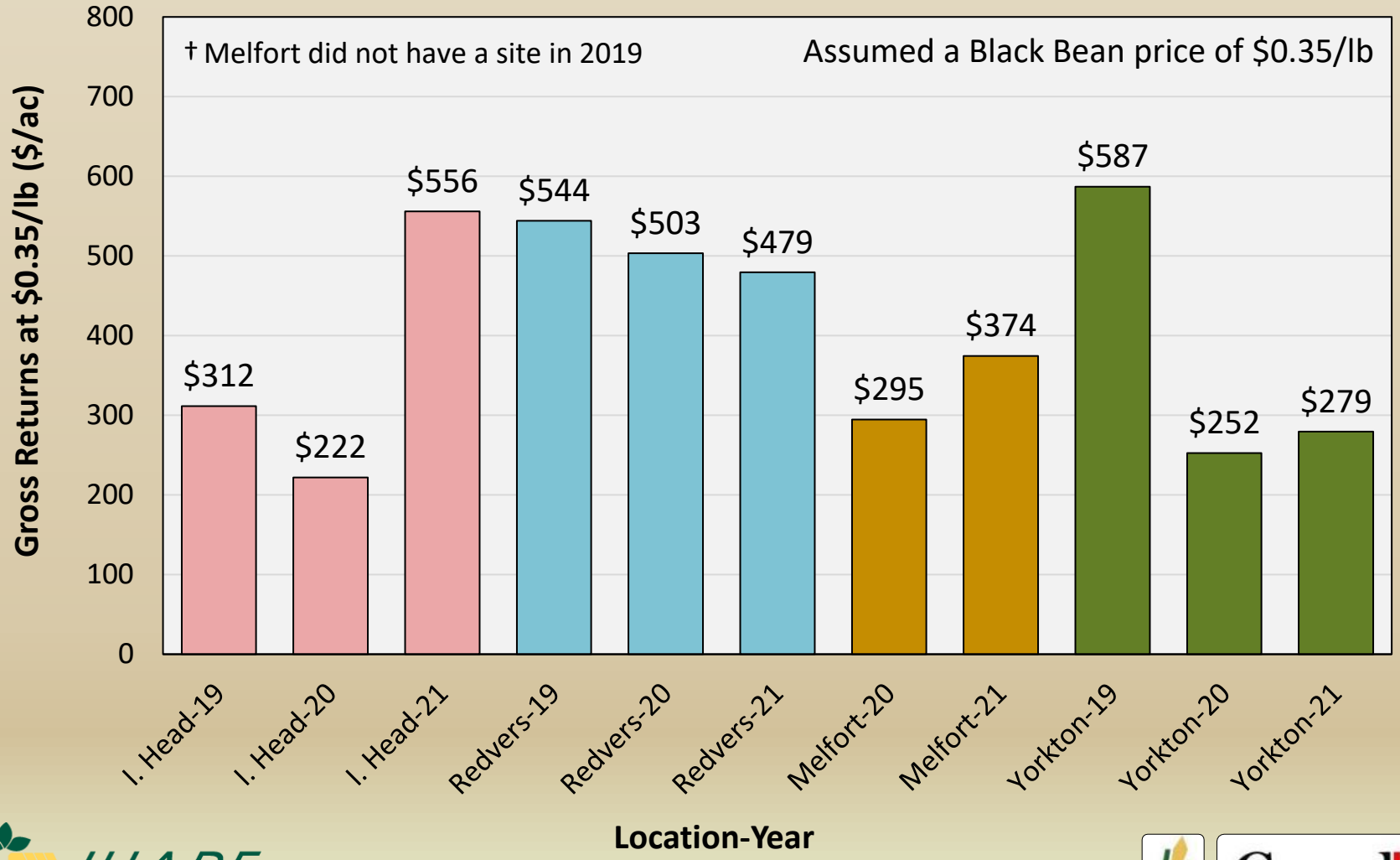
# Nitrogen Fertilizer Rate Effects on Dry Bean Seed Weight at Indian Head (2020 vs. 2021)



# Dry Bean Yields Achieved Under Dryland, Solid-Seeded Production at Indian Head, Redvers, Melfort†, & Yorkton from 2019-21



# Gross Returns for Dry Beans Under Dryland, Solid-Seeded Production at Indian Head, Redvers, Melfort†, & Yorkton from 2019-21



# THANK YOU

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