

Comparing Planting Technologies for Their Impact on Seed Placement and Yield in Small Grains



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2021 ASA/CSSA/SSSA Annual meetings

Project
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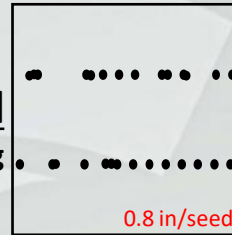
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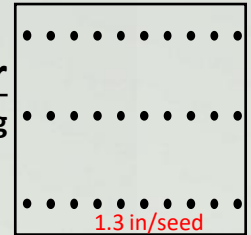
Introduction

- Small grains in United States traditionally planted with grain drill
- Recent interest in precision planting technology
- Also broadcast incorporation for faster planting

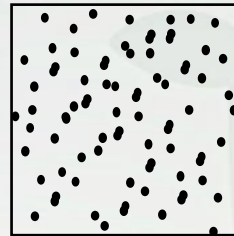
Seed drill
7.5" Row Spacing



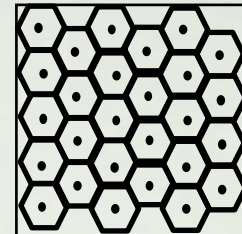
Precision Planter
5" Row Spacing



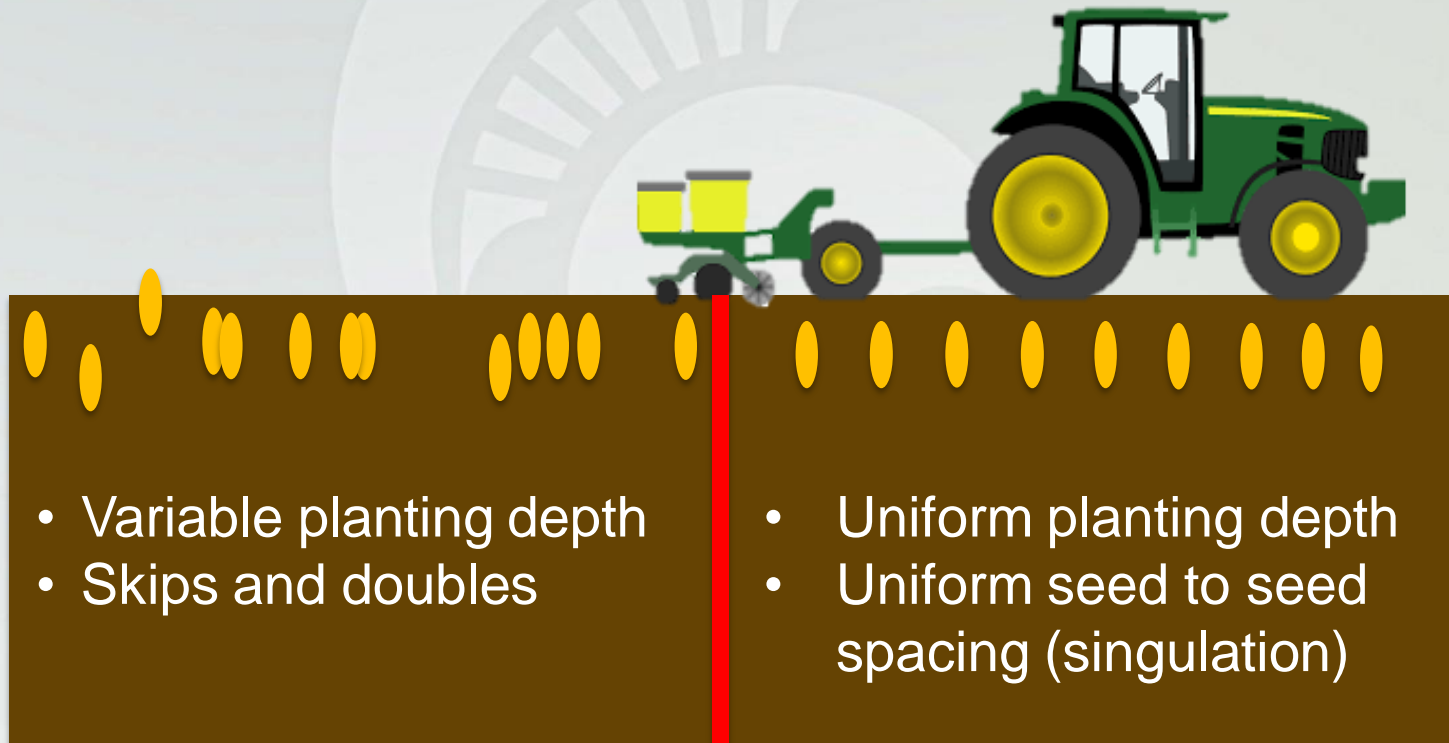
Broadcast



Ideal



Uniform Seed Placement



- Variable planting depth
- Skips and doubles

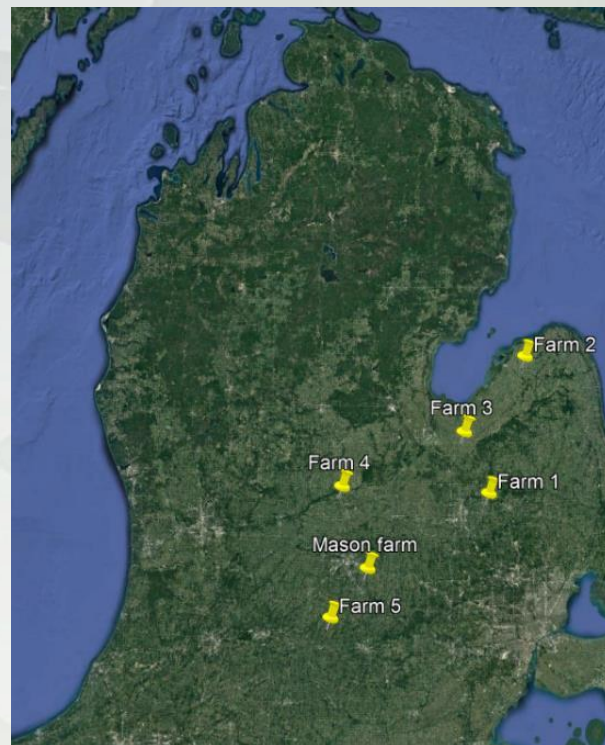
- Uniform planting depth
- Uniform seed to seed spacing (singulation)

Objectives and Hypotheses

- Objective 1: Compare precision planter to traditional drill
Hypothesis: Precision planter will improve yields due to precise seed placement.
- Objective 2: Compare broadcast incorporation to traditional drill
Hypothesis: Broadcast incorporation will have lower yields due to variability in seeding depth.
- Objective 3: Compare higher vs. lower seeding rates for broadcast incorporation
Hypothesis: Increasing seeding rate under broadcast incorporation will make up for yield lost from seeds planted too deep or too shallow.

Materials and Methods

- Conducted at 5 Michigan farms
- Randomized Complete Block Design, 4 replications
- 2–5 farms per objective
- Seeding rates: depended on location and treatment (≥ 3.0 m seeds ha^{-1})
- Other management per state recommendations:
 - P and K according to soil test levels
 - ≥ 135 kg N ha^{-1}
 - Fungicide at flowering





Drill (JD 1590 No Till Drill)



Precision Planter-PP (Monosem 4NG Planter)



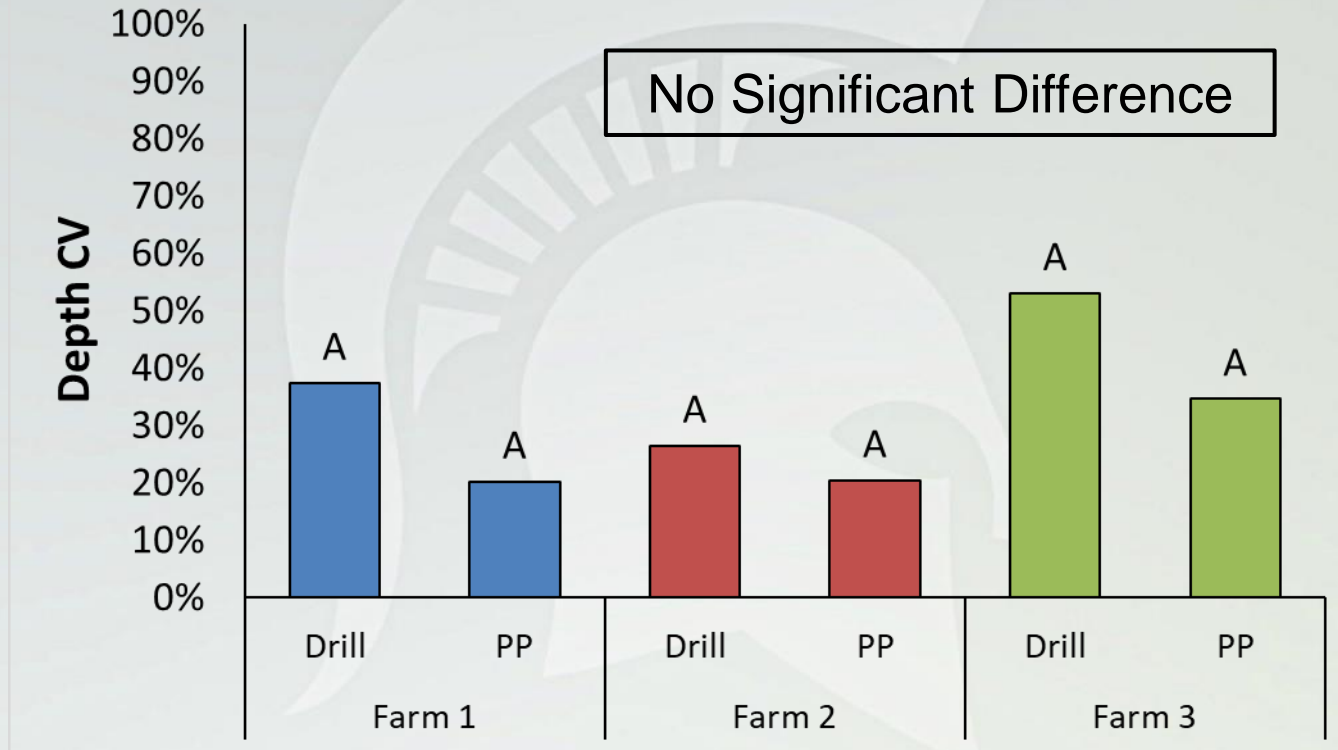
Broadcast Incorporation- BI: Horsch Joker with Gandy Air Seeder, Degelman Pro Till, Vertical Tillage Tool

Data Collection

- Stand counts (Feekes 1-2)
- Seeding placement: seeding depth and variability (coefficient of variation)
- Tiller and head count before harvest
- Yield, moisture, and test weight at harvest
- Subsamples for quality parameters (kernel weight, protein, deoxynivalenol)
- Data analysis: using SAS ANOVA procedure ($\alpha = 0.1$)

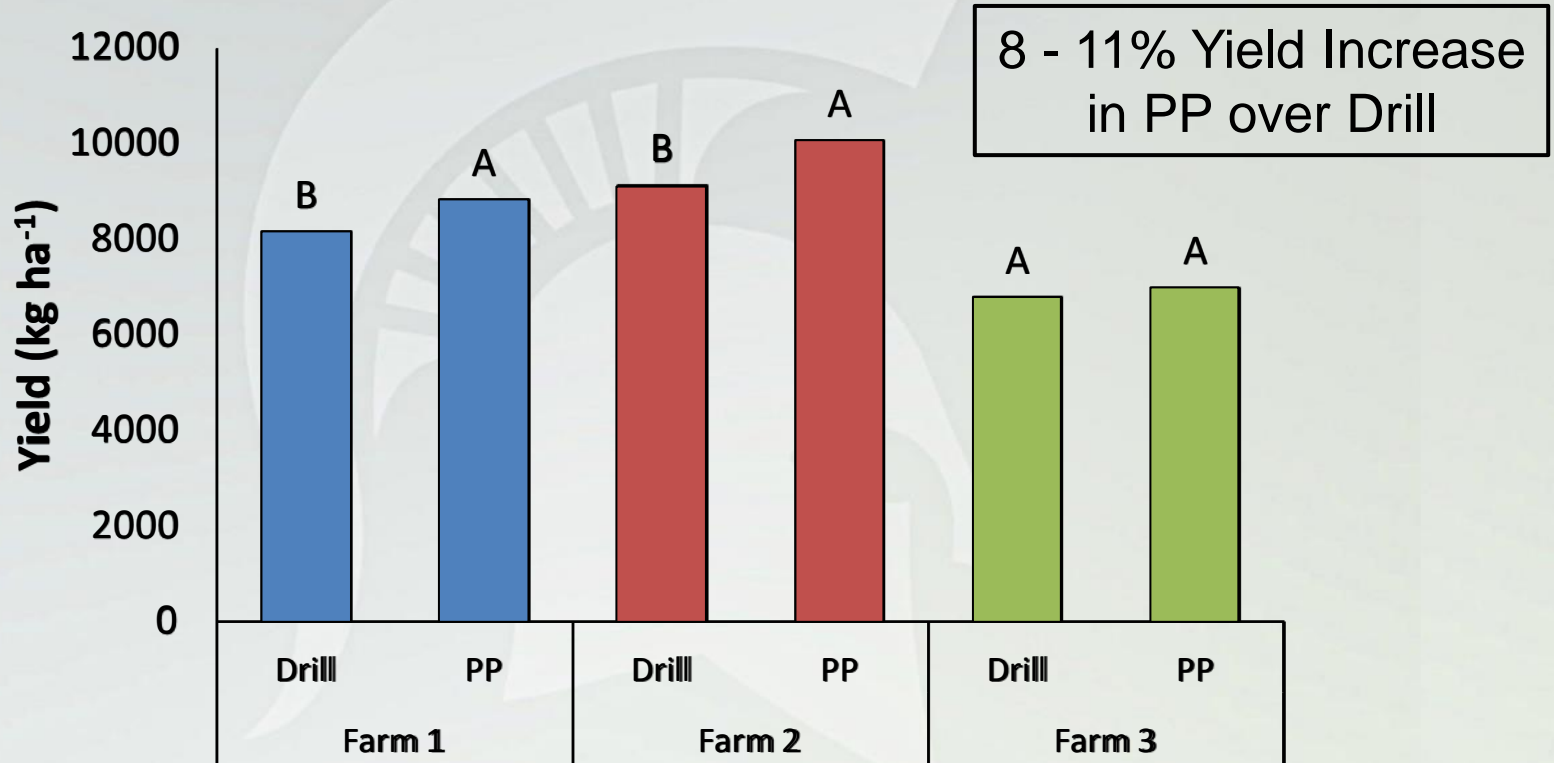


Depth Variability – Precision Planting vs. Drill



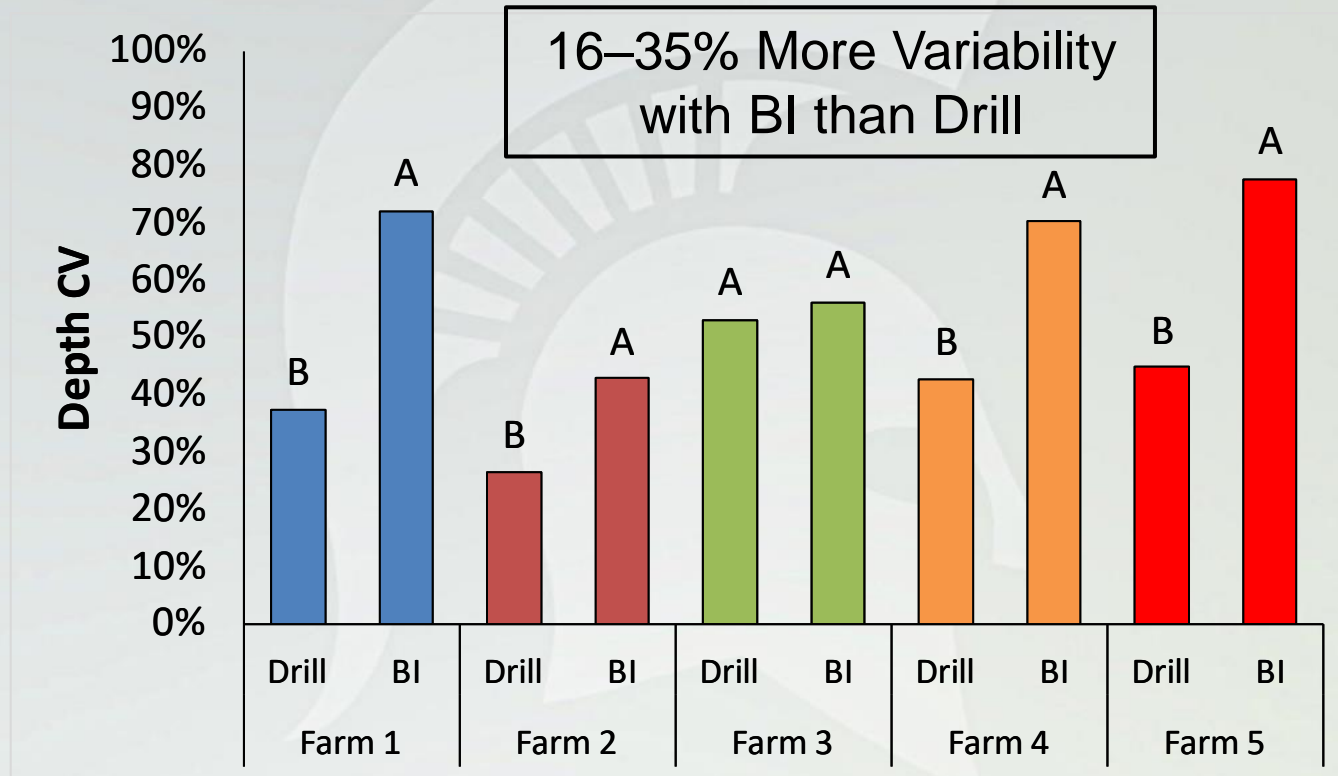
Bars with the same letter within a farm are not significantly different

Yield – Precision Planting vs. Drill



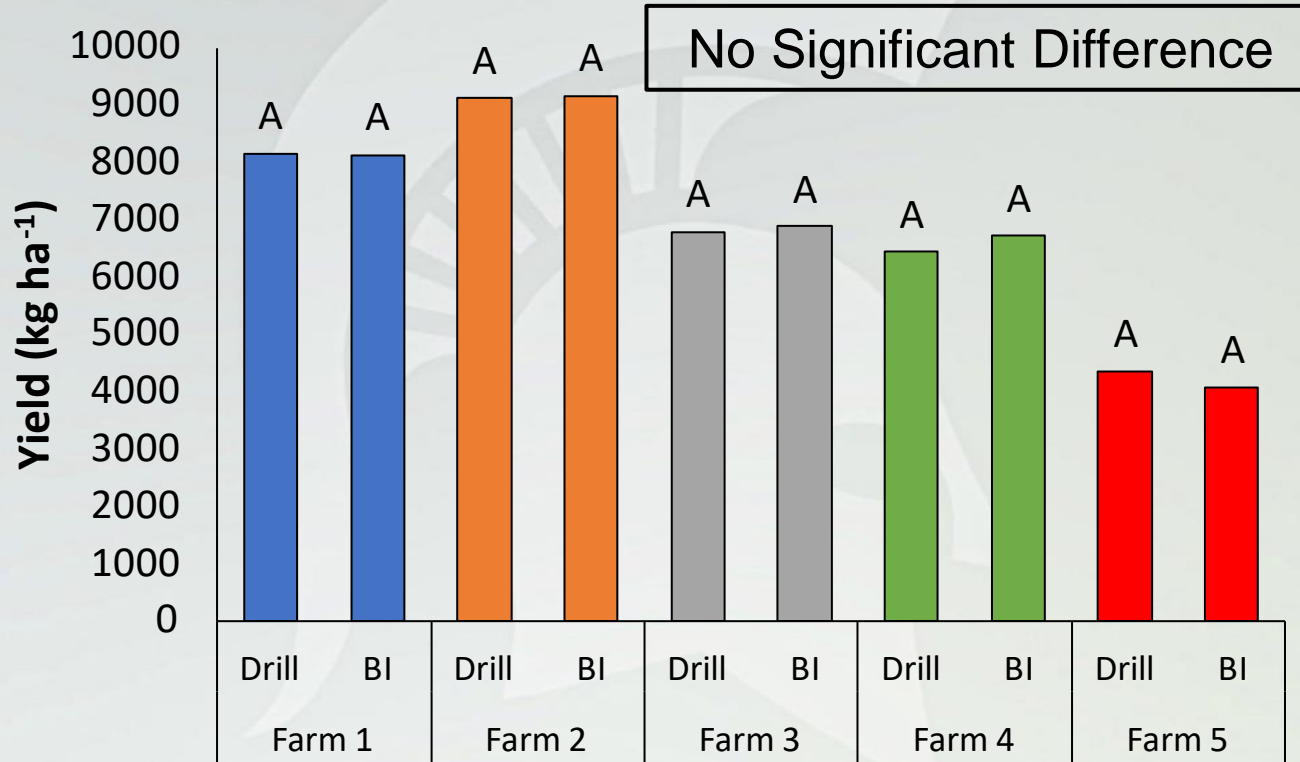
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Depth Variability – Broadcast Incorporation vs. Drill



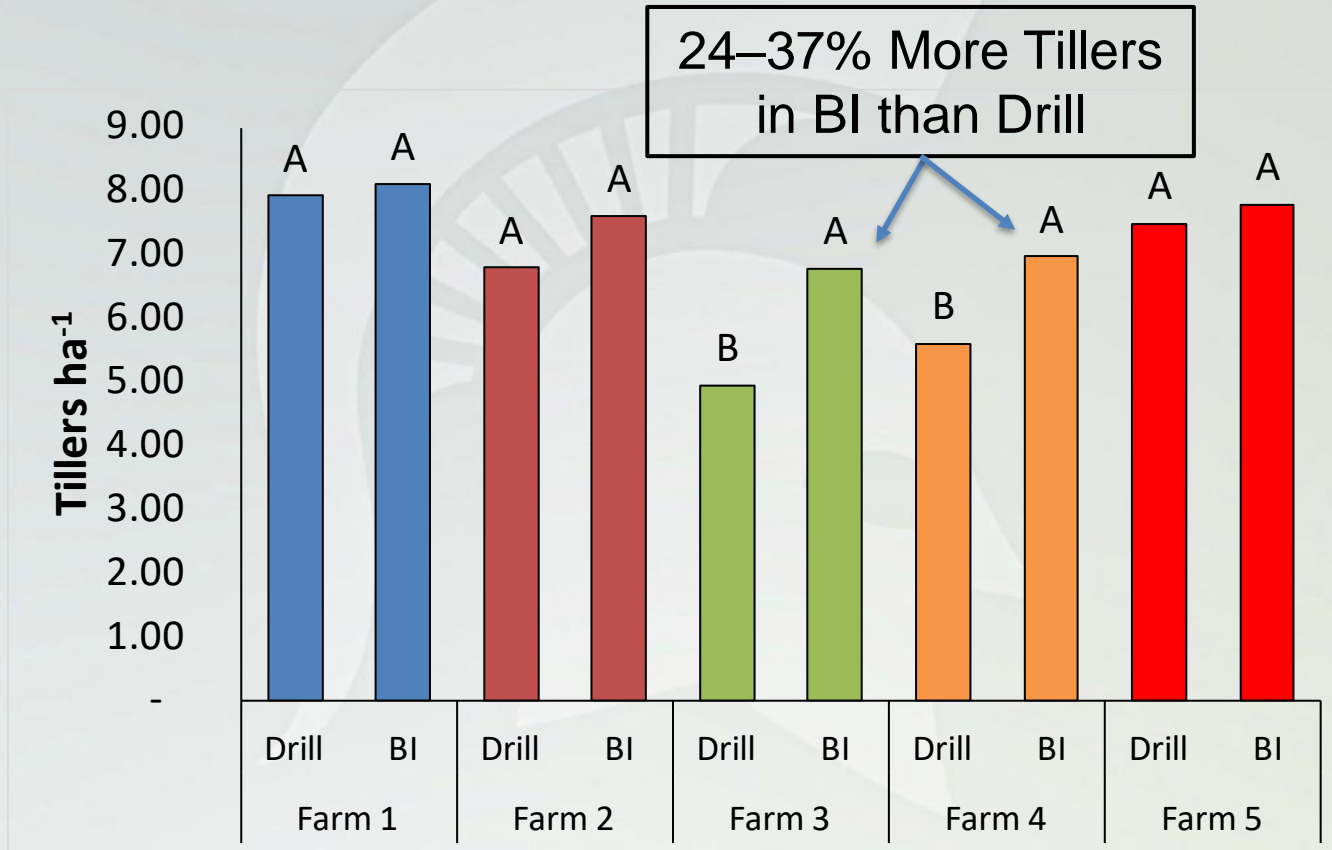
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Yield – Broadcast Incorporation vs. Drill



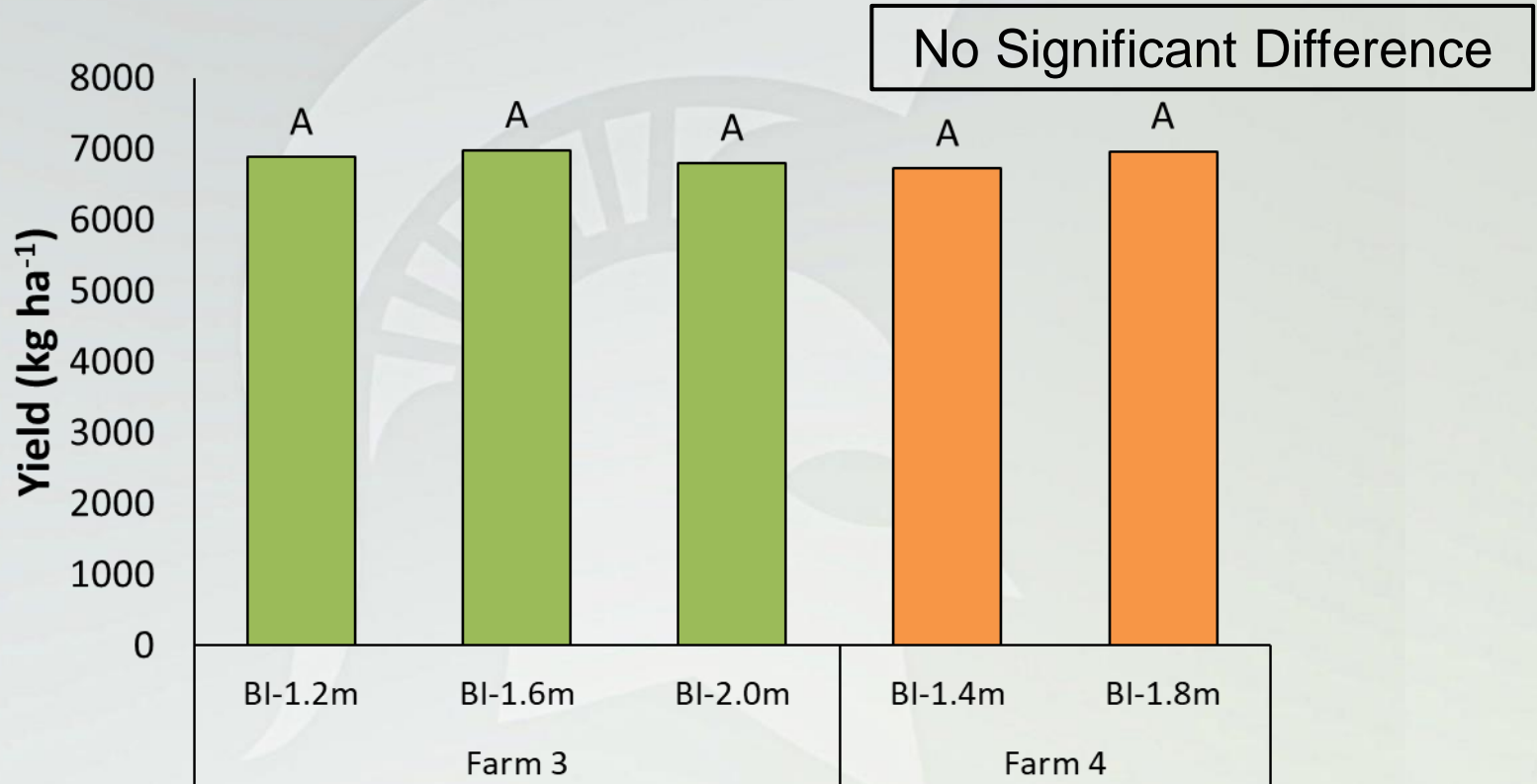
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Effective Tillers – Broadcast Incorporation vs. Drill



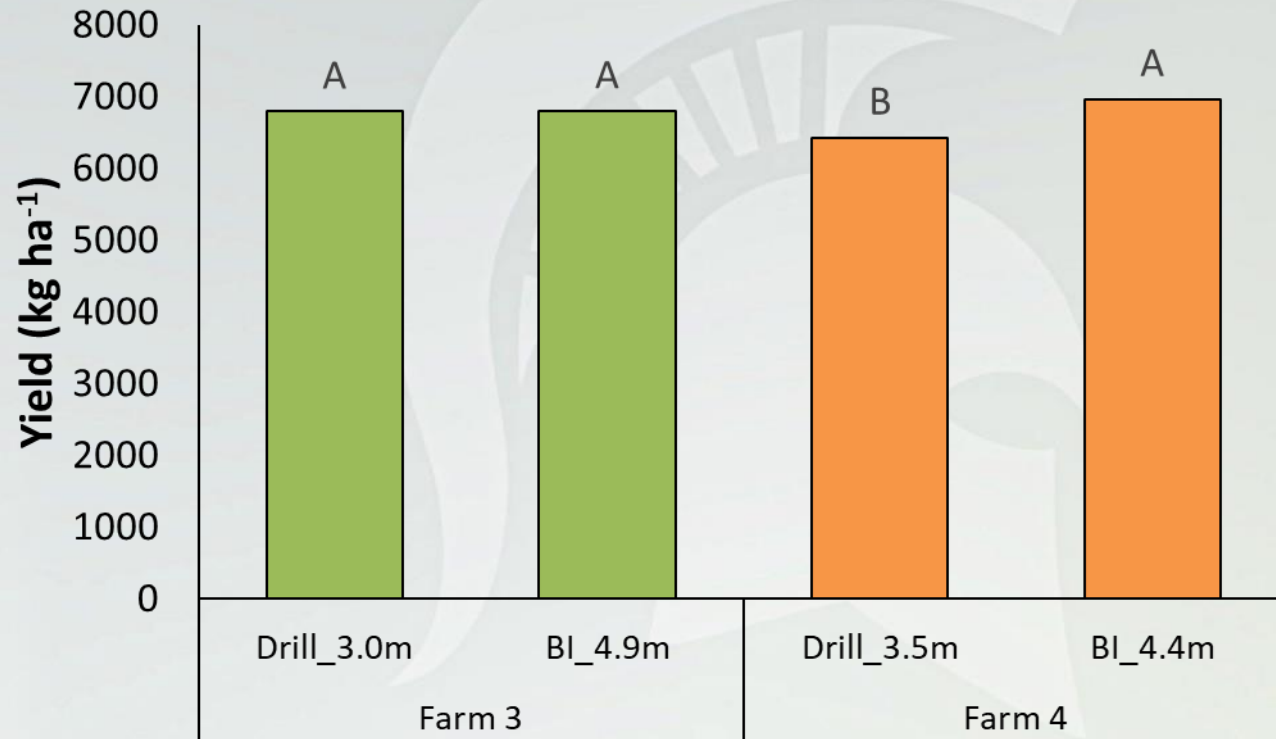
Bars with the same letter within a farm are not significantly different

Yield – Seeding Rates Response in BI



Bars with the same letter within a farm are not significantly different

Yield – Seeding Rate Response in BI vs. Drill



High-Rate BI 8%
Higher than
Standard Drill

Bars with the same letter within a farm are not significantly different

Summary and Future Directions

- No yield difference observed between drill and broadcast
- Precision planting provided 8–11% yield benefit over drill
- Seeding depth variability was highest with broadcast incorporation and lowest with precision planting
- Improved emergence and plant stand with precision planting than drill, but no discernible trend when comparing against broadcast
- No yield difference between seeding rates in broadcast
- Future Directions
 - Evaluate seed spacing uniformity across planting methods
 - Compare planting methods under late planting conditions

- Tom Siler
- Harkirat Kaur
- **Farmer Cooperators**
- Lillian Wierenga
- Madeline Yaek
- Cole Mallory
- Braden Heimbaugh
- Micalah Blohm

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Thanks!

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